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The views expressed here are not necessarily those of the editors, nor are suggestions published, by that fact to be considered recommendations, All views have been welcomed and are presented for readers to consider and to approve or disapprove.

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DEDICATED

TO

SMT. INDIRA GANDHI

Smt. Indira Gandhi (1917-1984)

DR. GRACE MORLEY — *A Tribute*

In the death of Dr. Grace Mc Cann Morley, the world of scholarship in general and museums in particular has lost an outstanding leader of international repute. Dr. Morley was the first Director of the National Museum in New Delhi (1960-66) and was the founder and head of the International Council of Museums' Regional Agency in Asia. She was associated with several museum projects in India. Her untiring efforts, and the guidance and inspiration provided by her to museum professionals heralded a new era in the museum movement of India. In 1982 she was awarded Padma Bhushan for her outstanding contribution to Museology and last year she was honoured by the American Association of Museums. There was hardly any aspect of Museology that she has not taken interest in or contributed to. She had travelled widely and encouraged museum programmes in several parts of the world with a missionary zeal. At the age of 84 she was still active and one of her recent official engagements was the delivering of a keynote address on "Museums and the Cultural and Natural Heritage" at the All India Museums Camp in Calcutta.

In India she used to be always referred to as 'Mother'. She was the mother to nourish not only the institution she built up so well, but also her younger colleagues to be worthy of a great profession.

But museums and museum problems and personnel were not her only passion. She responded to the beauties of Indian architecture, sculpture, painting, music and dance with the delight of a real connoisseur and initiated *rasika.*

Dr. Grace Morley was a meticulously thorough editor and took pains to persue the writing of many art-historians and offered many constructive suggestions.

Above all, she was a human being, generous and gracious, who had identified herself with the complexities of this large continent with its plural cultures, felt intensely and sincerely for the future of the nation, its material of the human wealth. One may not be a believer in rebirth but in Dr. Morley's case the only explanation can be that perhaps in some previous birth she belonged to this part of the world. Spiritually and emotionally she was an Indian: she will so remain in the minds of many.

सत्यमेव जयते

PRIME MINISTER
INDIA

MESSAGE

Museums preserve a nation's heritage. They make it accessible to large sections of people. Museums are an important aid to our country's cultural regeneration. A greater integration of museums with our educational system will help to spread consciousness of our country's legacy and instil a sense of pride in young people.

I send my good wishes for the Conference of the All India Museums Association of India.

(Rajiv Gandhi)

New Delhi,
January 22, 1985

Contents

Editorial

General Section

The Culture Vision of a Prime Minister 1
M.L. Nigam
Museums: Their Educational Potential 5
G.N. Pant
Stylo-Documentation and Art Museums 10
V.H. Bedekar
Museum—The Ulterior View: An Etymology 22
Charu Smita
Multiple Dimensions of the Ethnographic Museum in Multi-Ethnic Society 31
A.K. Das
Exhibiting Coins in Museums 34
Sunjay Jain
Anthropological Collections with Special Reference to Ethnography 39
U. Das
Indian Museums and the Public 43
M.L. Nigam
Environment Simulating and Environment Interpretive Exhibits 49
V.H. Bedekar
William Carey and Development of the Concept of Educational Museum in India 54
S.K. Chatterjee
Archaeological Collection for Tomorrow 58
C.T.M. Kotraiah
Teaching Potential in a University Museum 64
Atul Chandra Bhowmick
University Museum and Community 72
O.P. Tandon
✓ Visitors in Museums 77
Kamal Shankar Srivastava
Museums of Anthropology in India 82
Surjit Som
Documentation of the Ethnographic Exhibits Displayed in the "Tribal Fair" at Ahmedabad 96
R.R. Goswami
Down the Memory Lane 101
Smita J. Baxi
Technique of Glass Making at Firozabad and Some Other Centres in India 103
O.P. Agrawal and Tej Singh

Technical Section

An Approach to Preventive Conservation 115
C.B. Gupta

Atmospheric Pollution and Cultural Property—A Report on the Seminar Organised by the Salar Jung Museum 119

D. Bhaskar Rao

Ethnological Collections, Conservation Problems and their Solution in Government Museum, Madras 123

V. Jeyaraj

Museum Publications 129

Sudhakar Sharma

Museum Photography--Composition, Creativity and Communication 133

P.K. Saha

Insect Pests of Museum Materials their Deleterious Effects and Methods of Control 142

Iftikhar Alam

Vikram A. Sarabhai Community Science Centre—Science Museum Activities

C.J. Sanchorawala

Agharkar Museum, Allahabad University, Allahabad 165

S.P. Tiwari

A New Ivory Gallery in the Salar Jung Museum, Hyderabad 166

D.N. Varma

A Brief Note on the Exhibitions held in the Prince of Wales Museum During the Year 1983-84 169

B.V. Shetti

Some Rules For Preservation of Museum Objects 171

Poonam Agrawal

New Acquistions

Prince of Wales Museum 183

A.K. Das

Recent Acquisitions of Salar Jung Museum 185

M. Basava Rao

Recent Acquisitions of Govt. Museum, Madras 187

Recent Acquisitions of Sardar Patel University Museum, Gujarat 189

N.H. Shastri

A Short Note on the Recent Acquisitions of the State Museum, Lucknow 190

R.C. Sharma

Govt. Museum and Art Gallery, Chandigarh 194

V.N. Singh

New Acquisitions Bharat Kala Bhavan, Banaras Hindu University 196

B.N. Jha

Publications of Different Museums

List of Publications 201

EDITORIAL

This volume was in its planning stage when we, with rest of the world, were stunned to learn about the sad and tragic assassination of Mrs. Indira Gandhi, our late lamented Prime Minister whose love for the museums is too well-known to be recorded. We recall with tearful thanks that one of the jobs attended to by her just before her final departure, was the participation in the Golden Jubilee Celebrations of the State Museum, Bhubaneshwar and, in fact, earlier it was proposed that the All India Museums Conference would be inaugurated by her. Man proposes and God disposses. As a token of humble gratitude it was decided to dedicate this volume to the perpetual memory of Mrs. Gandhi.

When this volume was in the last stage of printing, the museum profession had to sustain yet another great shock, this time Dr. Grace Morley, our loving 'Mother Goddess', attained *nirvana*. Painfully we had to include a second obituary.

For the very first time we have been able to print two volumes of the Museums Association of India during one session—vol. 37 (1982) has already been despatched and Vol. 38 (1983) is in your hands for comments. It is earnestly desired that this year also we will bring out two volumes 39 (1984) and 40 (1985) and present an up-to-date account.

We have, as usual, brought out a number of articles on various aspects of museum activities.

Our resources are extremely limited, we are much below the poverty line and are surviving mainly on the Central Government grants. We have no office, no secretarial staff, no space to keep the publications, no sales room—practically nothing and yet we have lived gracefully all these years; for this credit goes entirely to our museum bretheren who are the torch-bearers but may we appeal for more active cooperation. Please send many articles, unpublished and of high quality, of course, and well in time. Kindly see that this and the previous journals still available with us, are purchased by your museum library.

We are extremely thankful to Shri Sunjay Jain, our Assistant Secretary, and Shri Ganesh Rao of the Archaeological Survey of India who have been associated with this volume from tip to the toe-they are present on every page, on every word.

We are conscious of several mistakes in printing, in proof-reading, in photographs and we own them in all humility—partly because we are not professionals and mainly because we had to work under very odd circumstances—still we have been very honest and sincere and it is for you to judge how much we have failed.

To Mrs. Indira Gandhi—this volume is dedicated.

To Mrs. Grace Morely—the entire museum community is dedicated.

M.L. Nigam
G.N. Pant

General Section

The Cultural Vision of A Prime Minister

M.L. NIGAM

Smt. Indira Gandhi, the late Prime Minister of India, was a true Indian who loved Indian culture more than anything else. This is why, she was concerned with the preservation and propagation of old Indian culture which is a perennial source of inspiration to our National life.

Probably for the first time in the history of museum movement in India that a Prime Minister invited eminent Indologists, art-historians and the museologists of the country to hold discussions on the development of museums, archaeology, archives and libraries of Indian culture. The meeting was held on the 30th of June, 1981 at 11.30 A.M. in the Prime Minister's Chamber.

During the discussions, the then Prime Minister asked, "What efforts are being made to bring awareness of the significance of arts and culture in the day-to-day life of the common people? What is being done to bring the heritage to the youth? What are we doing to increase awareness of museums among children and students? Are we making efforts to collect, preserve ethnologically valuable/functional rural objects which are bound to become extinct in near future? Is there any interlinking with the university departments and research organisations? What is the level and standard of publications which are being brought out? Are they within the reach of the common man?" etc. At the end, the Prime Minister referred to the need for pursuit of excellence in different spheres and greater involvement of different sections of the community in various fields of our cultural activity.

It is, therefore, time to pause and ponder, on the problems raised by the Prime Minister, Mrs. Indira Gandhi? Are we moving in the right direction to fulfil these objectives? Are the modern museums of India really effective in serving the Indian masses? Or 'Do we still stick to the traditional approach about the functions of museums? These questions, no doubt, need a good deal of heart-searching and throw open a challenge to those who serve the museum profession in India.

After Indian independence in 1947, there has been a dramatic change in the socio-economic condition of the country. An unprecedented scientific and industrial progress and the great technological break-through have not only raised the living standard of people and improved national economy but also have brought in a remarkable change in the outlook of the Indian society. At the same time, large circulation of money, the improved means of transport and love for their cultural heritage have resulted in people visiting the ancient monuments and museums throughout the country. Everyday, large crowds of people and school children pour through our museums. The number of visitors is liable to increase vastly in the near future. Hence, the relationship between the museums and the people, under the present circumstances, must be thought out afresh.

Till the middle of the 20th century, Indian museums acted more or less as store houses to collect, preserve and interpret specimens of material culture of the past for the handful of scholars. The idea of public service and the museum-education was little known to them. With the result, a number of scholarly publications were brought out which throw adequate light on the history and culture of the bygone era. Yet, there was no scope for the common man to derive benefit from these public institutions. After the dawn of Indian independence, it was realised that the Indian museums must serve the cause of all people, irrespective of their age-group, social status and academic background. As a scholar rightly puts it, "Museums are a service, run by people for people, and their continued existence can only be justified in these terms"[1]. This new concept and ideology requires a fresh thinking and approach to define the functions of the museums in relation to the public of modern India.

It need not be over-emphasised that the museums of the post independence era in India have received enough support and sympathy, both from the government and the people. There has been a considerable increase in the number of museums of all types, i.e. history, art and archaeology, ethnology, health, science and industry etc. which are meant to serve all sections of the society. The old museums have expanded. The public munificience is also forthcoming gradually by way of gifts and loans. Both the Central and Provincial governments are allocating funds, according to availability, to expand and develop the museum-movement in India. In other words, the new existing conditions and circumstances are quite favourable and conducive to the growth of museum service in India. Still, the Indian museums are far from the desired goal. What can be the reason for ineffectiveness of our museum programmes and public service? Why our museums are unable to cope with the changed social circumstances?

To my mind, the fault lies in the basic approach and functioning of our museums. Firstly, the Indian society is undergoing a fantastic change in its outlook and structure, whereas our museums are unable to shed off the age-old traditions and functions which were formulated under the British rule with a specific purpose in mind. The museums of the British India were meant to know more and more about our ancient past in order to understand the Indian mind, customs, manners, myth and philosophy which helped the alien power to establish themselves firmly on Indian soil. The idea of public service was not there. Hence, the functions of Indian museums during the British regime were object centred to lay more emphasis on objects than on the people. It was only a handful of scholars and researchers who utilised the collections and derived benefit from the Indian museums. The Indian people in general remained untouched and unconcerned with the museums and art galleries.

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[1] I.M. Evans. "Specimens or people: a question of communication. Museums Journal, Vol. 69 No, 3, 1969; p. 106.

The object centred policy of Indian museums of the past has made us so much blind by devotinn to the museum specimens in our collections that we have forgotten that the objects by themselves lack complete meaning, significance and value eocept in the context of their usefulness to people. We tend to forget that museums exist not only for scholars alone, but for all people of all ages.

It is in no way intended here to minimise the importance of scho!arship in Indian museums which is so essential. Yet museum scholarship is the means and not the end and it must be utilised for the benefit of all people. This is possible only through well conceived educational programmes of our museums. The task of scholarship is to study the past and link it with the present but it is the museum education which will take the results of scholarship to the people and open them for debate. The museum objects, therefore, must be utilised as tools to create ideas and affect the minds of the people.

Before we discuss this theme further, let us also take into consideration the changing social pattern of developing India. As a result of the great scientific and industrial progress, Indian social pattern is undergoing a rapid transformation. In view of the large population of India still being illiterate and poor, the power of decision-making and resourgces are centralised in the hands of a few industrialists, bureaucrats, technocrats and specialists. The other segments of the society are still struggling for their right place and identity in modern society. In fact, it is this down-trodden section of the society which needs be strengthened and enlightened in order to create a balance in our social structure. Museums should, naturally, be more concerned with this class with a view to raise their living standards and bring them nearer to the main stream of our national life. *Yet, the museums are governed and controlled mainly be the bureaucrats, administrators and specialists who, knowingly or unknowingly, would not share their age-old reservations and privileges with the common man. Thus, there is a danger of continuing the sociological and cultural imbalance in our society.*

To cite an example, let us take the problem of modern art in India. During the post-Independence era, there has been a great awakening in art-field and the modern Indian painters and sculptors are adopting to different language of art and new symbols and motifs which are not familiar to Indian eyes. With the result, the Indian masses are totally cut from the new art and artistic traditions. The spokesman of modern art in India, however, assert that their art is meant for those who can understand and enjoy it. It is in no way their responsibility to teach masses about their art.

This has created a new cultural oppression where the bulk of Indian population is deprived of their deserving right to know and enjoy the new art trends and creations.

The museums of India lie in between these two extremes. The new concept declares museums to be public institutions. How can museums justify their existence and the public funds, which they utilise from their growth, unless they serve the masses, the grass-roots of our society? It is, therefore, the bounden duty of Indian curators and other staff of Indian museums to maintain close links with the specialists, scholars and technocrats with a view to gain from their new researches and inventions, on the one hand, and dispense his knowledge to all sections of the society, on the other, through their varied and meaningful educational and cultural programmes.

It is, thus, high time that the Indian museums revise their policy and programmes in accordance with the changed conditions. They must open their reserve-collections to specialists and research scholars so that they study and find out answers to various new sociological problems through their researches and the same should be highlighted by museums through their educational programmes for the benefit of the general public. All researches on museum collections must be result-oriented. Any research, which remains unaccountable to people, has little relevance to modern society.

The last but not the least, is the problem of the new increased casual public to Indian museums whom they intend to serve. Who are the people coming to our museums? What are their ideals and aspirations? What are the socio-cultural needs of people in the changed circumstances? Not a single country-wide survey has been attempted by Indian museums to understand the people's behaviour and the changed sociological pattern of developing India. The age-gap between the old and younger generations, which finds reflected in their thinking and attitude towards life are vital to guide in planning the policy and programmes of modern museums. Why should we take it for granted that all educational and cultural programmes planned within the four-walls of museum by specialists and educationists will be acceptable to all segments of Indian society?

The museums to day are considered as public institutions. It is therefore necessary that their role and services must be public-oriented. It is high time that a number of sociological surveys be conducted throughout the country to identify the public, their needs, ideals and aspirations with a view to formulate more meaningful and effective museum programmes. More and more younger people i.e., students of schools and colleges should be involved in museum educational programmes. If the Indian museums serve the masses by enlightening them of their rich cultural heritage, it will be a real tribute to our late Prime Minister, Smt. Indira Gandhi.

Museums: Their Educational Potential

G.N. PANT

Introduction

In a museum are collected. documented, studied, preserved and exhibited different art, archaeological, ethnographical, scientific and technological objects so that people can look at them. admire them, learn from them and enjoy them today and pass them on to the succeeding generation. There are all sorts of museums in India—some very old like the Indian Museum, Calcutta—which have celebrated centenary or new like the Rail Transport Museum, New Delhi. established only a few years ago. Then there are national museums like the National Museum, New Delhi; multi-purpose museums like the Prince of Wales Museum, Bombay or the Salar Jung Museum, Hyderabad; very big museums like the Government Museum, Madras or very small one-room university or school museums; specialised ones like the Calico Museum, Ahmedabad or art, science and technology of museums. There are museums of gems and jewellery or navy and air-force stamps and coins, of Police and Central Bureau of Investigation, of dolls and toys, of arms and warfare and then there are museums which contain such a heterogenous collection that they fit into no specification at all. All these impart education through entertainment.

Educational Aspect

In a museum art objects which are most rare, most beautiful and most antique can be seen and studied freely. Rarity is not the only consideration—their workmanship, historical association, connection with some important discoveries, links in the development of human culture, etc., are also taken into account. Whatever is the collection, educating the public is now regarded as one of the primary functions of a museum. Guided lecture tours, gallery talks, classes within the exhibition area and film shows relating to the gallery topics have become common. Self-guiding equipments like small tape recorders—if the financial position of the museum permits—which the visitors can carry around listening to the recorded talk on exhibits as they go can be used. Temporary exhibitions, evening cultural programmes, open discussions, seminars and symposiums, lunch hour concerts and similar educational activities attract the visitiors. Comfortable chairs and sofas, cheerful decoration, plants and flowers, cafeterias and tea-rooms, smoking areas, etc., help to create an atmosphere from which maximum benefit can be derived from looking at the exhibits.

A Visit to a Museum

It is neither possible nor advisable to see the entire museum in one visit Some require a life-time. It is inevitable that in each visit something is missed but what is gained is of greater significance. It is better to come out of the museum with a few clear impressions rather than with a muddled mass of soon-forgotten images. Selected looking is recommended. Most of the visitors try to see as much as they can within a short time and so they have practically to 'run' inside the galleries. They do not gain much except the feeling of having visited a museum. Some visit with a definite enquiry or a particular purpose and go straight to the gallery (or object) and concentrate on the objective.

Exhibition—the Vital Part

The vital parts of any museum are the objects themselves which are real and capable if correctly interpreted, of conveying information in an accurate manner Here lies the skill of a curator, i.e. exhibiting the objects in such a way that the visitors are automatically drawn towards it. Except in the 'historic house' 'personal Museums' objects can hardly be displayed in their original setting. Mostly the objects are put on show under artifical conditions inside the show cases. Still these are properly arranged, in chronological or thematic order, so that their purpose and meaning are made plain. Labels, both big gallery labels and short individual ones, in many cases, are needed for identification and understanding. These should be short, meaningful and to the point. At places, where the object needs no clarification owing to its being very obvious, the label can be avoided. Pictures, photographs, drawings, charts, maps, models and other subsidiary materials can be used to explain an exhibit but they should always be regarded as supplementary to the objects themselves.

Museum Literature—A Teaching Aid

The picture post-cards, picture books, guide books, pamphlets, illustrated booklets, hand-outs, and other pictorial and printed matter available for sale in the museum counter constitute valuable teaching material unobtainable from any other source. Colour reproductions of paintings and drawings, facsimile prints of historical documents, models of monuments, plaster-of-Paris or fibre glass replicas of sculptures, colour transparencies etc., can assist the interested individuals and institutions in building up their own collections. Resources of a museum are practically unlimited and in India they have still not been properly exploited

First Hand Knowledge

Listening through the radio. looking through the television, video or films and doing through teaching aids are extremely useful, no doubt, but all these provide information at second hand. In a museum one can learn not through the book, picture, sound or word but by direct contact with real things and there is no surer way of learning than by such personal experiences. The tangible, solid objects—their true structure, size, shape and colour have a better impact on the viewers.

Before A School Visits the Museum

Museums play an important part in both informal and formal education but unfortunately very few museums in our country have been set up for the express purpose of the enlightenment of school children, much less of general public. It is, therefore, essential that a team of teachers is given a short training course. They may be permitted to hold classes within the galleries using sometime art objects both on show or even in the reserve. If possible, every museum should have a separate Department of Education with at least one officer looking after the academic institutions. He may inform the local teachers what his museum can offer. The teacher should give the students some idea, not of what they are going to see, but of what they are going to look for. Thus they start out purposefully and return with at least part of that purpose fulfilled. For this preparatory work the museum can provide study kits or other material to the teachers before hand.

Schools to Museums

For most of the school children museums are full of exciting things but the children need guidance otherwise they may feel lost. It is not enough that they are brought to the museum and made to march through the galleries in queue. It is unfortunate that most of the museums are arranged with adults in mind Most of the art objects are above the head of a child both physically and metaphorically. The teachers accompanying these children lay undue emphasis on discipline asking every now and then to maintain silence. The child naturally gets bored and instead of looking at the object he starts playing inside the gallery. His activities prove a menace to the exhibits and both the teacher and the museum attendant scold him and the child unconsciously develops a hatred. He decides never to visit the museum again; it becomes a place to be carefully avoided. The museum, on the contrary, should create a favourable situation so that a child is engaged in personal expedition or visual exploration. He may be provided with a work-sheet which he may complete with sketches or information based on the objects. Specially produced games, puzzles, questionnaires and many other devices may be devised If possible, a well-equipped studio or a workshop can be made where the children or other visitors are allowed to paint, work with clay or make models. While enjoyment is the key-note of all these activities, their educational value is far-reaching. In some cases art and craft classes for the youth and adults can be held in the evenings. Hobby clubs can also be set up.

Follow-up Programmes

Unless work in a museum and school is closely integrated much of the value of a visit is lost. 'Preparation', 'visit' and 'follow-up' are interlinked. On returning to school what has been seen, heard or done in the museum should be recorded in some way. Writing essays, painting pictures, making models or even playing a drama based on the exhibits can be thought of. Work-sheets, cross word puzzles, questionnaires, log books form an excellent basis for follow-up work in the classroom.

Special Programmes for Special Persons

Wherever feasible special visits for the blinds, who can only 'see with their hands', can be arranged. They may be allowed to touch, to feel, to fondle. The sense of touch is important for all of us, and for the blinds or physically handicappeds this is of utmost significance. Similarly, housewives, defence personnel, farmers and labourers, illiterates and semi-literates can also be persuaded to visit and programmes befitting their tastes can be chalked out.

Museum to People

Despite every effort a large number of persons still find it difficult to visit even the nearby museum. The reasons are many but mainly lack of awareness and transport facilities are responsible. To overcome this some museums have set up Mobile Exhibitions on bus, truck, jeep or special vehicles. Replicas, facsimiles and a few original objects are arranged in this van which moves from place to place. A film unit is also fitted with this exhibition. There are, no doubt, limits as to what can be included in a travelling exhibition. Too large or too heavy, fragile or rare, costly or tiny art objects are generally avoided.

Some museums have started loan service where original art objects are lent to the school for some days. This material is carefully selected to illustrate and extend the school curriculum. Catalogue and other museum literature, educational material, plaster cast models can safely be lent.

The schools can be encouraged to set up their own exhibitions or at least display replicas of art objects in their 'History Room' or dissectable models which can be taken to pieces and reassembled in their 'Science Room'. There can be working models showing literally what makes a clock tick.

Periodic Excursions

Some museums like the National Museum of Natural History, New Delhi, arrange periodic excursions to the nearby bird sancturies, wild life parks, zoos and botanical gardens. Visits to the neighbouring monuments, cultural sites, archaelogical excavation and explorations can also be arranged. Sometimes the participants can discover rare things. What we find out ourselves we remember far better than what we read or are told about.

Epilogue

Coordination between the museum and other educational institutions is the need of the hour.

The Museum has to serve as an instrument for education and cultural development for all, from the general public to the well-informed at every level. A museum philosophy and museum ethics have to be established so that an awareness is created and more and more people are attracted to museums. In developing countries like ours the education potential of a museum is a new weapon, a new tool to be exploited for the all-round growth and understanding of the people. The museum provides a quick, effective and economical way of building up a nation by creating in people a rare sensitivity for understanding a nation, its background, resources, history, culture, crafts and arts.

Stylo-Documentation and Art Museums

V.H. BEDEKAR

Museum documentation is the record of information concerning its collections relevant to the museum functions. Museums are accountable to their controlling authorities and, therefore, they are required to maintain inventories of their collections for audit or checking at any time. This is an administrative need. But there are other forms of museum documentation which help the curators and those interested in making appropriate use of the collections voluntarily. Such documentation is for identification and classification of museum objects. This is known as cataloguing. It amounts to assigning an individual object to one or more categories of any organized and accepted system of classification so that information about that particular object can be associated to the comparable categories in which it can be included.

The stylistic information about a museum object has to figure in the documentation of art museum materials. But there is no universally accepted system of documenting such stylistic information. In India, as well as outside India, only some museums have 'style' as a separate heading in their columns for catalogue cards.[1] But the following discussion will demonstrate the great need to organize stylo-documentation as an ancillary form of documentation in Art museums in addition to the general documentation. This article is devoted to the methodology of such specialized documentation.

Art museums in India and elsewhere are waking up to the tasks they can and should undertake to prove their worth. One of these relates to the study of styles. Objects of arts, when observed carefully and compared with one another reveal special features. These features are of two categories—Firstly, there are features which are common to groups of art works. These features can be called 'generic' or 'class characteristics' which all members of the group share to some extent in order to justify their inclusion in that particular class. But there are other features which make each art object different from other objects even though they belong to a single group. A comprehensive analysis of these characteristics forms the basis for identification and classification of objects of arts into groups. While such grouping can be made on the basis of many grounds like age, provenance, subject matter, material, technique, the most relevant basis is the style which amounts to the way the objects are designed. In Fine Arts this is the most important basis for distinguishing groups of objects. The study of styles, therefore, serves as the backbone of art education and, without it, the essence of art cannot be either appreciated or communicated. The Art museums which possess the wealth of objects of arts cannot afford to neglect the study of styles and, therefore, they must incorporate 'style-information' in their documentation to an adequate extent. This is such a specialized work that it requires a separate term. Hence, we call it 'Stylo-documentation', a term which I have coined for this purpose.

The curators of art museums realize that every work of art resembles others in some respects. But it is also distinctive in other respects. In some works of art they find co-existence of features which are significantly and recurringly associated with basically divergent styles. When they study styles they notice that some features continue to appear while others disappear, sometimes giving place to new features.

In the writings of museum catalogues our curators have observed that styles have differed in a single place, also in a single period and more important it is noticed that style of a single known or nameable artist has undergone substantial changes. But such changes cannot be particularized and connected with specific examples in the absence of a Stylo-documentation.

Hence, the common problem before curators is to know the nature of styles and their interrelationships.

It is not easy to define style but we may agree with Munro's observation: "A style is never a tightly integrated, exclusive whole; its constituent traits can always be disassociated and combined with traits of other styles where the will and means permit" (Munro, 1970, p. 248).

How to know these phenomena of association and dissociation at the hands of Indian artists? Our artists were not always imitative. They were not always circumscribed by the range of the pre-existing schemata or conventions. Many, if not all, can be credited with inventing new ones when the artistic situation demanded such innovation. But in the present system of art museum documentation it is not easy to identify each such 'schema' and to assign its creation to an individual artist either nameable or anonymous. In Stylo-documentation, stylo-features are indexed in relation to the individual works of art in which they are found and by a process of comparison and elimination it is possible to credit an artist with an innovation.

Defining a style in terms of its essential characteristics is an arduous task and can be satisfactorily completed by specifying certain traits as commonly shared by a large number of works of art associated with a place and period. The composition of them should distinguish that group from other groups of works of art. Yet there is great difficulty in finding a composition of characteristics as present in all the works of a particular place or period. Therefore, before styles are defined in terms of their essential features, much weeding is necessary of those elements which can be demonstrated as optional, substitutable, or as some of the alternatives available to the artists working in that style which they did not use in all their works. Identification of sets of essential and optional stylo-features is not easy without a systematic Stylo-documentation. If however, it can be proved that all known traits are found in examples of all known styles sometime or other and at least in some examples, then each style may not have a unique set of essential characteristics but only a unique combinations of some of them. These can be termed as 'stylo-configurations' and their identification and indexing in relation to their examples is possible in Stylo-documentation.

Museum curators need to know which are the 'typical' examples of style. Such 'typical' examples are expected to possess all or most of the features recognized as essential in the context of that style. In the area of Natural History collections such exercise is centred around "type specimens". The natural history specimens can represent whole classes to which they belong. But it is not easy to find typical style objects of art where compositions of key-features fluctuate widely. The recent concepts of styles reject "the traditional models of art history as a linear sequence of self-contained periods, each characterized by a persistent set of traits and datable as to when it began and when it ended (Arnheim, 1981, p. 282). The clear-cut boundaries between styles and substyles have disappeared. A style is to be understood as a 'concept' which is usable for classifying works of art but it needs to remain valid. It is only by means of the Stylo documentation that different concepts of styles or substyles can be periodically validated or their constancy can be checked. In this regard, it is necessary to clarify that a style could not have remained constant in all its characteristics. For this reason, the new view is to consider a style not as a 'sum of attributes' but as a 'Gestalt' or a 'special structure' which remains unchanged (Arnheim, 81, p. 283).

A new look at the styles and their in-depth studies reveals flow of changes in the composition of characteristics, sometimes slow, sometimes fast, in which some features appear and disappear. Their appearance and disappearance might be shown as interrelated or not, by means of the Stylo documentation. All styles tend to change and for the full interpretation of the museum objects, it is helpful to organize a Stylo documentation to decide the relation of an individual work of art vis-a-vis the relevant changes in styles. All this work imply a large number of comparisons amongst the individual features on one hand and the configurations of features on the other. Without an aid of efficient Stylo documentations the curators will be reluctant to undertake thousands of such comparisons necessary for a full interpretation of their collections of art objects. Let us, therefore, turn the methodology of organizing a usable system of Stylo documentation.

As has been stated above, no Art museum has to organize a Stylo documentation System as an independent form of documentation. Assuming that it has a cataloguing system which it should, a Stylo documentation should be arranged as an adjunct to it. The end-result of its use in the case of a single work of art or a group should provide a stylistic profile. When a museum succeeds in organizing its Stylo documentation an analysis of each work of art or a given group will generate a concise, coded, abbreviated and indexed characterization and it should be entered under a suitable heading in the general documentation (such as, under the heading 'Style', 'School', or 'Stage/Style', or 'Artist/school/style' or any variant of it, or if no such special heading exists, then the characterization in its coded form may be entered under other headings such as, 'Description', 'Short/Brief Description', 'Description with School and period', 'Nature of Object', 'Special features of object', etc. etc.)

Such coded stylistic characterization will be a marked improvement over the usual highly generalized class names of styles, as in the case of Indian miniature painting, Mughal, Pahari, Rajasthani, Deccani, Western Indian, or their regional styles like, Bundi, Jaipur, Mewar, etc. etc. or Basholi, Jammu, Chamba, Mandi, Guler, Kangra, etc. etc. These names are sometimes qualified at present by giving the period by mentioning the century, like 16th, 17th, 18th century or, in some cases, still dividing a century into 'early', 'middle', 'late' century, etc. Yet these appellations including their limited qualifiers do not give the curators or educationists adequate information about nuances of the stylistic variations which the works of art, say miniatures, represent. In fact the whole current overemphasis in using only limited general names is on ignoring the differences found in works of art. This is merely a mockery of classification. Dissatisfaction with this short-sighted approach to museum documentation will motivate the new generation of art museum curators to seek better methods of distinguishing the significant differences in styles as exemplified by individual works of art in their collections and also docking, or by tying in of the Stylo-documentation with the general art museum documentation.[2]

It should be understood clearly that in the Stylo documentation a judicious combination of graphic/pictorial and written media should be made. Not only photograph(s) of each work of art but enlargements of stylo features and/or drawings should be included in the dossier for each work. Since many classes of works of art are painted, some notes on the use of colours and their combinations should be made. To avoid vagueness, some suitable standardized codes should be used for naming not only the different 'hues' or colours in popular language but their 'value' and 'saturation.'[3]

It cannot be too much emphasized that Stylo documentation may use words but it should not be equated with paraphrasing everthing which is present in a work of art into word-description. The medium of images, either two-dimensional or three-dimensional, is different from the medium of language. Conversion of one into another irreducibly is impossible and, for the purpose of art museum Stylo documentation, not necessary. This is particularly so in the light of new devices available to record the images and have the graphic data as retrievable as the word-data. In India, where the Art museums may not command the required resources to obtain sophisticated gadgets for image-data-retrieval, they can begin the organization of the Stylo documentation by relying on photographic aids, colour transparencies and colour indexes on one hand and the data in the written form, on the other.

Besides the dossier for each work of art for graphic data and other notes, there will have to be worksheets for recording the stylistic observations. These data sheets will have a few headings for the identification of the collection, the object itself, the name of the identifier and date of the documentation. These items of information will ensure the identity of the work of art and indicate the person responsible for the act of Stylo-documentation. If an art museum intends to include data about some objects outside its own collections for the sake of comparison then the identification of the public and private collections to which the other documented works belong should be mentioned in this part. If original stylistic observations are later revised then fresh dates for alterations in the documentation should be included. For the sake of establishing the identity of a work of art, its accession number should be recorded. Its class should be mentioned such as 'Painting on paper'. Then comes the title or name by which it is officially recognized like 'Krishna lifting mount Govardhana'.

The next part of the data-sheet will record observations about the stylistic features found in the individual work of art. Each such observation will enable the curator either to differentiate the style of that work from all others, or to match or liken it with some others. Such observations will help the curator in drawing comparisons or parallels between works on specific points.

The stylo-features in representative works of arts will have to get their 'addresses' in the Stylo-documentation. This is done by using proper and common names to the various images found in the works themselves. Many of these images might have figured in the usual description recorded in the other museum documentation most particularly on the catalogue cards. But many others might not be so included. Hence all those constituent significant visual images or stylo features found in each work of art will have to be listed on each data sheet for Stylo documentation. Such list will become wastefully long, confusing and tangled unless the individual items are also categorized under suitable headings. For the sake of efficiency two lists in the form of indexes will have to be prepared.

In one, all the nameable images will be alphabetically listed thus making it easy for finding which, and how many, of the images in each work of art have been the bases of stylistic observations. By their inclusion in the list these images are given the status of Stylo-features. The need to include proper names is obvious. In the representational works of art a feature may be listed as a 'young lady' but if she is Radha, in the context of that work, it is more convenient to index that image as Radha so that different ways of creating her images can be comparable, if required.

The above general index of stylo-features is the initial finding device and should be treated as a sort of directory. Subsequently, there will be more dhtailed lists each serving as a check-list to be maintained itemwise. Such a ceeck-list will record the different versions, variations, alterations and modifications of the stylo-features in some actual example(s) of works of arts. This is a very crucial part of Stylo-documentaton.

In the past, generally, stylistic peculiarities were mentioned by naming certain features like the presence or absence of 'Chakdar Jama', or 'a willow tree' or 'a crescent-shaped mark on a feminine forehead', or a 'framed pavilion'. But these do not help in any in-depth stylistic analysis because not only different artists may portray them differently but the same artist may fashion or shape them differently under different influences or in different contexts. This variability of a feature in different configurations or as parts of different style-structures, is the basis of its transformation from a non-essential feature, in one situation, to an essential stylo-feature, in another. An example of a stylo-feature "Willow tree" given below in the context of Basholi painting in particular will make the methodology of preparing a 'check-list' clear. The check-list refers to specific works, here miniature paintings, where that feature is found in the specific variations so that anyone who wants to verify the stylistic statement can do it unlike in the attributions in the past when personal judgements of a few individuals could not be checked or challenged and were accepted uncritically.

Term—'Willow': (Willo(s) = tree(s) with drooping branches—creeper(s) with drooping branches) (Different from creepers or trees with flowering branches not having willow-like leaves). It is shown as under.[4]

1. Willow appearing as a separate tree with drooping branches,
2. as very tall,
3. having slender trunk,
4. rising very straight,
5. not rising straight but curving at some places,
6. above curves introduced to suit the artist's efforts in making other images more visible and creating distance between them and the tree form,
7. trunk not looking slender but quite thick almost like a thin palm tree,
8. with zig-zag decorative markings on the trunk,
9. trunk looking as resting on ground with strait bottom line and the base somewhat broader than the slender trunk,
10. trunk painted lighter than the background,
11. some branches painted partly and hidden behind other tree forms but their presence indicated by spirally climbing stems of creeper also seen partly,
12. curving upper branches of willow painted as if emerging beyond other tree forms, without showing the trunk or creeper as such,
13. branching on both sides,
14. almost symmetrically branching on both sides,
15. with very tall slender trunk, symmetrically branching and the drooping branches falling evenly on both sides at one upper level,
16. above branches not symmetrically painted,

17. above trees used in the picture to divide it vertically into compartments for representation,
18. branches painted growing, alternately, on the opposite sides of the trunk,
19. branches drooping but not straight down, and in wavy manner,
20. branches curving abruptly while drooping,
21. willow tree in the picture shown abruptly curving sharply sideways to appear as if growing towards the *dramatis personae* or over their heads,
22. above convention but branches on both sides though more turned above the main figures,
23. branches emerging only very low, out of the tree, or creeper stem, for compositional purpose,
24. above, but branches at many levels also,
25. branches at the lower level, middle level, at higher level, at different places,
26. above but in which the lower and middle level branches are shown intersecting or overlapping with the drooping long branches coming down from the higher levels
27. tall slender willow tree but markedly with very few branches to suit the pictorial needs,
28. convention of willow tree with remarkably long branches drooping so down as to appear near the ground,
29. slender rising willow tree with drooping branches painted on one extreme side of the picture,
30. willow creeper supported by another kind of tree and such as only a few branches curving into picture from one extreme side as a compositional device,
31. only a few branches of willow appearing within the picture area abruptly from one side of the picture and no trunk or creeper is shown thus, serving as a pictorial device mostly as a 'space filler',
32. conceptual forms of willow tree not shown emerging from the ground but abruptly appearing over another image,
33. A single willow tree occupying significant place in the picture space,
34. not an exclusive tree but a part of a frontally depicted row of trees as a pictorial convention,
35. above but willows and other kinds of trees, shown alternately, as a convention,
36. painting of identical branches in the same picture but some as parts of willow tree(s) and others of creeper(s),
37. drooping branches below and/or curving branches above of willow in juxtaposition or as parts of conceptual decorative tree types having their foliage or boughs in circular overlapping shapes resembling many-petalled 'dahlia' flowers.
38. same as above but with other tree types with foliage forms globular-in which individual leaves are delineated all over within contours,

39. drooping branches not appearing as parts of willow trees in the picture but parts of other kinds,
40. branching with gradually tapering shapes and also with leaves progressively looking thinner and smaller towards the ends of the branch,
41. branches not like above but sizes and shapes more or less uniform,
42. branches with remarkably short and broad leaves,
43. branches not making contrast against the background,
44. branches making conspicuous contrast unlike the above,
45. willow branches appearing silhouetted against lighter background,
46. green willow branches painted also against greenish background.
47. trunk to willow tree modelled only on one side in colour.
48. willow tree/creepers/branches painted in light colour against extremely dark, almost black, background,
49. only leaves of curving, drooping branches painted in lighter colour, very emphatically, against dark background and stems, inconspicuously shown,
50. stems of willow branches painted much lighter than both the background and the leaves,
51. willow tree with all its branches painted against flat background like a tracery. deliberately avoiding overlapping by the tree of the sky portion and even the line of horizon,
52. drooping branches also flowering,
53. above, with individual flowers painted on the middle stems uniformly, at equal distance,
54. above, but individual flowers painted on both edges of the branches, uniformly, at equal distance,
55. above, with flowers in reddish tint, with red outline and a light coloured spot in the centre,
56. same with white flowers, having red colour in the centre,
57. same, but flowers in white colour drawn as stars,
58. same but flowers painted green and encircled with yellow tint.
59. same, but flowers in yellow colour with red dot in the middle,
60. slender willow trunks in red colour and stems, of curving, drooping branches, also in red,
61. willow branches shown around a silhouetted shape of another kind of tree, some willow branches over the dark shape, others, outside, silhouetted against a lighter background and this feature used to soften the severity of contrasting dark tree,
62. same, but branches painted over the dark tree with light coloured flowers as an additional device to soften the dark tree shape,
63. willow branches on which tiny shapes of birds shown and generally merging in the pattern of leves and branches.

After such a check-list is prepared, the relevant examples of works of arts in the collections can be examined to specify which of the above stylo-features are found in which individual works. Some examples below may make the method clear.

The real examples have been chosen from different museum collections, mostly reproduced in (Archer, 73) (Khandelawala, 58) (Coomaraswamy's Boston Museum Collection Catalogue No. 5) (Lalit Kala Akademi Portfolio No. 20), etc.

(I) Willow in the picture tilted 'Vishnu', shares the stylo-features (1), (2), (3), (7), (21), (27), (29), (30), (33), (44), (45), (51).

(II) Willow in the picture titled 'Man with cranes', shares the stylo-features (1), (2), (3), (13), (14), (20), (32), (34), (35), (41), (44), (45), (51).

(III) Willow in the picture 'Radha and Krishna' shares the stylo-features (1), (10), (23), (25), (29), (31), (36), (40), (44), (51).

(VI) Willow in the picture 'Krishna and flute' shares the stylo-features (1), (2), (3), (4), (9), (13), (27), (40) (44). (45), (52), (54).

(V) Willow in the picture 'Bather' has stylo-features—(1), (2), (3), (4), (13), (15), (17), (27), (33), (44), (45), (51), (52), (53).

(VI) Willow in the picture 'Krishna and Gopi' shares the stylo-features (11), (30), (40), (49), (53).

(VII) Willow in the picture 'Bather' has stylo-features—(21), (22), (23), (24), (25), (29), (30), (44), (49), (51).

(VIII) Willow in the picture 'Lady with a bird' has the stylo-features—(1), (3), (4), (9), (10), (13), (27), (29), (30), (40), (43), (51).

(IX) Willow in the picture 'the Pet deer' has the following stylo-features—(1), (2), (3), (4), (21), (22), (29), (40), (44), (45), (47), (51).

(X) Willow in the picture 'Radha and Krishna under a tree', has stylo-features—(11), (21), (23), (24), (25), (40), (44), (45), (52), (53) (61).

(XI) Willow in the picture of 'Jehangir' has the stylo-features—(1), (2), (3), (13), (17), (22), (33), (41), (44), (45), (51), (54).

(XII) Willow in the picture—'Girl with attendant' has the stylo-features—(1), (3), (4), (5), (9), (10), (16), (20), (22), (30), (33), (43), (47), (50), (52).

(XIII) Willow in the picture 'Brahman' shares the stylo-features—(1), (2), (4), (10), (13), (16), (21), (22), (29), (33), (42), (43), (51), (52), (54).

(XIV) Willow in the picture 'Radha and Krishna make love' has stylo-features—(12), (34), (37), (40), (44), (49), (51), (63).

(XV) Willow in the picture 'Goda-Mallara' has the following stylo-features—(10), (11), (21), (25), (26), (29), (30), (34), (40), (44), (48), (54), (55).

(XVI) Willow in the picture 'Saindhava' shares the following stylo-features—(31), (40), (44), (48), (54), (59).

The few above exmples may make it clear that willow as a motif is not in istelf a stylo-feature but its variants found in actual works of art can certainly command such a status.

An inverted index can also be prepared so that each of the 63 stylo-features of 'willow' can be linked with all the stylo documented paintings in which that specific stylo-feature is found. A tabulated analysis of the presence of all such features will provide the basis for determining the fluctuating interrelationships amongst the stylo-features. A comprehensive comparative study of these configurations will not fail to give us in concise, coded, indexed and capsule form the characterization of each work, and of any group of works, which is suspected of having stylistic commonalities in the matter of stylistic structures.

The various motifs found in art works require categorization as a prerequisite before the stylo-features found in them are indexed and the checklists are made of their actual incidence. The categorization may be done to suit the nature and composition of the art museum collections. It is difficult to recommend a single scheme of categorization which will be valid for all kinds of art museums. A sample of a scheme for a collection of Indian paintings may as under:

1. Identification of 'picture planes' and artist's own approaches to image making.
II. Borders in relation to the pictures, if overflowing or cutting the inside images.
III. Human figures and their accessories—
  —Portraits and individualized types, other kinds.
  —Postures, dresses, ornaments, jewellery, body decorations, facial and bodily types and proportions
IV. Animal figures—
  —Insects, birds, mammals, reptiles, aquatic animals, composite and mythical creatures, specific, nameable specimens, conceptual and observable creations.
V. Backgrounds—
  —Architectural and Accessories Vs conceptual-domes, walls, niches, balcony, battlements, borders, panels, plinths, brackets, pillars, courtyard walls, gateways, turrets, plinths, etc.
  —Beds, bolsters, curtains, carpets, chinaware, bottles, plates, dishes, vessels, lamps, pegs, bird cages, etc.
  —Non-Architectural—
  Sky, clouds, line of horizon, lightning, rain, storm, land, rocks, furrows, hills, mountains, water, streams, rivers, pools, tanks, trees, shrubs, grass, creepers, forest, flowers, bower, etc.
  —Combination of Architecture and Natural in backgrounds, and non-representational backgrounds.

An indispensable aid for Stylo-documentation is a manual specially compiled to provide guidelines at every stage of data-collection and data-analysis. That ensures consistency and control of terminology. The task of organizing a Stylo documentation is challenging but very rewarding. Without it, the museum curators will not be able to overcome the limitations of the old and antiquated concepts of styles. Those concepts are too static and simplistic to be of any use in the interpretation of the quintessence of the worth of artistic heritage in the possession of the Art Museums. Stylo-documentation, in my opinion, has no substitute and, as elaborated above should be organized as an adjunct to the general museum documentation series.[5]

NOTES AND REFERENCES

1. The examples of those museums whigh have 'style' as a heading in their accession and/or catalogue proformas are: Data Card for Exhibition and in the columns of the Catalogue of the Crafts Museum, New Delhi; General Accession Register of the Government Museum and Art Gallery, Chandigarh; in columns of the Catalogue cards of the museums under the Directorate of Museums, Karnataka State; in the Object Documentation form of the Kentucky Museum, of the Western Kentucky University, and of the M.W. Strong Museum, Rochester, New York, U.S.A.; The term also figures in the recommended polyvalent type of proforma for preparing a descriptive catalogue card system; as heading No. 17, by the UNESCO-ICOM Documentation Centre, Paris. It does not figure in any of the forms recommended by the Museums Association of India Conference held at Mysore in 1973, but figures only in the proforma recommended by Dayanand Patel for miniature paintings, stone sculptures, given on P. 53 of the publication based on the conference proceedings. The information reievant to stylistic studies is usualy included in other related columns/headings which is one reason for the retarded progress in the documentation of stylistic characterization in art museums.
2. Even when the Data base is oriented towards eventual computerization such tying can be done with Data classes like 'Description' tag 64, Description (Style remarks) tag No. 65. Moreover, Data classes like Provenance (country) tag No. 76, Provenance (Remarks) tag No. 79, History (Period/Culture) tag No. 80, Significance, tag No. 89 can also include the stylistic coded characterization. See, the Manual for Museum Computer Network Data Preparation, by David Vance, Centre for Contemporary Arts and Letters, State University of New York at Stony Brooke, U.S.A. 1975.
3. Several colour indexes can be used such as Oswald system and Munsell system of colour organization. The Colour Harmony Manual of the Container Corporation of America is being used for the pilot project of Stylo documentation by the author.
4. The stylo-features Nos. 1, 2, 4, 7, 8, 9, 10, 13, 14, 33, 34, 35, 36, 37, 38, 39, 43, 51, 63 are based on 'The Devi is adored by the Gods', (Basholi, No. 3, Archer, 73). The Stylo-features Nos. 61, 62, are based on 'Krishna awaits Radha's bidding', (Basholi, No. 4 (iii), ibid). The Stylo-features Nos. 3, 15, 25, 26, 40, 44, 45, 52, 53, are based on 'The Devi dances on the dead giant', (Basholi, No. 1 (iii), ibid).

   The Stylo-features Nos. 54, 55, 56, 57, 60 based on 'The lady and the herd of deer', (Basholi, No. 5 (ii), ibid).

   The Stylo-features No. 11, are seen in 'The Lady and the pet rabbits', (Basholi, No. 5 (iii), ibid).

   The Stylo-feature No. 12, seen in 'Radha and Krishna on a hill-side' (Basholi, No. 20, ibid).

   The Stylo-features Nos. 27, 46, 49, 50, 58, 59 are found in 'Earth appeals to Vishnu', (Basholi, No. 6, ibid). The Stylo-feature No. 28 is seen in 'On the threshold of Youth', (Basholi, No. 10, ibid).

   The Stylo-features Nos. 18, 19, seen in 'Krishna answers the Cowgirls', (Basholi, No. 22 (v), ibdi).

   The Stylo-features Nos. 29, 30, 31, 42, found in 'Raja Dhiraj Pal of Basholi Seated', in (Kahlur) (Bilaspur), No. 7, ibid).

   The Stylo-feature No. 41, seen in No. X and, the features 47 and 48, in XVII and CCCXCVII of the Boston Museum Catalogue of Indian Collections, No. 5.

The others Nos. 5, 6, 16, 17, 20, found in 'Venugopal', (No. 11, Khandelawala, 1958). The Stylo-feature No. 22 found in a print showing a Nayika or Princess along with an attendant, in the Prince of Wales Museum, Bombay.

5. The article is based on a part of the manuscript of a book on Stylo documentation by the author in preparation. Although not a manual, it may, hopefully, demonstrate an improvised methodology based on actual work.
6. Archer, W.G., The Indian Paintings from the Punjab Hills, Delhi, 1973.
7. Khandelawala, K.J., Pahari Miniature Painting, Bombay, 1958.
8. Arnheim, Rudolf, 'Style as a Gestalt Problem', The Journal of Aesthetics and Art Criticism, Spring, 1981.
9. Munro, Thomas, Form and Style in the Arts, Cleveland, 1970.

Museum - The Ulterior View : An Etymology

CHARU SMITA

"The word museum is derived from 'Musei' and 'Museion' implying inspiration. In Greece, the claim of a place to the name Moveeioo, the Muses' realm seems to have depended on its general atmosphere rather than on its concrete features. It was a place, where a man's mind could attain a mood of aloofness above everyday affairs (Wittlin-1949)". If looked into carefully, the totality of the functional significance of the Museum may be explained in the word 'Museum' itself. An attempt is made here to explain the *ulterior view* of the word MUSEUM entailing the complete sense of the Museums in the present day context.

MUSEUM—if split, is the combination of the alphabets M,U,S,E,U,M, each of which could be used to make appropriate words providing an explanation of the aims and objectives of the Museum:

M—Man's (Taken as the Homo Sapiens)
U—Utilization
S—Surroundings (The environment-dynamic and static)
E—Exhibition (Of the selection from collection)
U—Understanding (In terms of recreation, education & research)
M—Mankind (The masses)

Thus the totality of the Museum may be explained as:

Man's Utilization (of) *Surroundings* (through) *Exhibitions* (for) the *Understanding* (by) *Mankind.* Wittlin (1949) has referred to Museum as a collection of specimens of almost any character and is in theory connected with the education or enjoyment of anyone, who may wish to avail of its facilities.

Now we come to the detailed explanation of each of the words individually and also in relation to the complete functions of the Museum.

Man: Amongst the animals, man is the most highly evolved. Man with his collective social force has been able to solve many mysteries of the natural phenomena. Primitive man spent most of his time in collection of food, wandering through the forests. With the development of physical anatomy and society, man's needs for survival continued to increase but at the same time his interests continued to widen from the basic necessity of pacifying the pangs of hunger. Social nature of man led him to have a family, recognition of kith and kin associations. Alongwith this man made new discoveries and inventions one after the other at a very rapid pace. These placed man on par with nature. Over the passage of time, while several men were busy in creating and inventing, there were others who as part of appreciation of the technological and aesthetical achievements began to collect and keep several pieces as worthy possessions. The initial consciousness towards developing the desire to collect not for day-to-day requirements but for aesthetical appreciation might have arisen will after the primitve stone age. But once this awareness came to man's mind, it continued to grow. In order to have better understanding of the nature, man also continued to gather facts both material and phenomenal from nature.

The manifestations of the socio-cultural happenings are elaborated by human accesories, which over the passage of time are so deeply integrated in the culture of the society that they become submerged in the various complexes of the society. Man first learnt to create with stone, later with wood, metal, animal skin etc. Right from the begining man exploited nature for his creations and discoveries. Man not only explored but also collected and preserved. Out of man's creations and collections museums were born.

Utilization: Utilization is man's own ingenuity. Basically, the social process of evaluation led man to learn the functions of many systems. The utilization of the artefacts made from the basic sources found in nature was governed by the norms of the society and also by the function of the artefacts. For example during the neolithic period man produced more efficient and smaller stone tools, so that they could be conveniently fitted into a bone to form a saw. The stone and bone tools which were invented for the primary function of skinning the animals and cutting the plants, were also found to be suitable for etching and chiselling cave walls, where primitive man lived. The second function of the same tools was utilization of the existing artefacts for aesthetic appreciation and for the sarisfaction of his innate desire to show off his artistic skill. A step ahead, he started colouring these drawings. We may assume here that before making the cave wall a canvas for his drawings, man must have used the ground and the trees as canvas for expressing his world view. But these canvasses could not retain the painting for long as the cave walls. Traditionally a piece of art or artefact was brought into a museum only when it was considered to be the best among its contemporaries. With the growth of culture, on one hand man developed the skills and technologies and on the other utilized them for the explanation of the fundamentals of an event or cause or else for making the artefacts. These are all being considered to be important for the museum.

Museum may corroborate the facts of the history by utilizing the facts from the surroundings or they may explain the facts of nature or the technological innovations. But museums always dwell in the realm of reality.

History, the written records of the cultures has many personal biases and is often represented in an altered way from the fact. But the Museum tries to utilize the fact for narrating the history, the technology, the art form or a natural phenomenon. Always these facts are collected from the surroundings.

Surroundings: The orthodox definition of the museum referred to the collection as the main body of the Museum. But more than the collection, it is the surroundings i.e. the environment, which is responsible for establishing the museum. Different kinds of environments bring forth various types of Museums. Various facts from the surroundings are picked up, to form a museum. The surrounding is represented at various levels: social, cultural, physical and natural. Different kinds of environments are based upon the social norms of various societies. The cultural evnironment refers to the customs, behaviour and manners of various living beings including the plants and animals. The physical evnironment describes the geographical surroundings of a particular social and cultural group. The natural environment refers to the various kinds of plants and animals found in a particular habitat. These four classes of environment are interrelated viz. the natural, cultural and social environment may vary from one kind of physical surrounding to another. Similar type of social surrounding may be found in different types of cultural, natural and physical environments. For example matriarchial societies are found in India in the North Eastern Hill region among the Khasis and also among the Nayars of Kerala. But these two similar social environments have entirely different types of cultural, natural and physical surroundings.

Apart from the permutation and combination of these four types of environments, the surroundings are also exemplified by the static and dynamic nature. Dynamic entails the basic characteristic of the theory of evolution whether of the life on earth or of a particular technology or an art form or the culture. Dynamic environment is for the utilization of man's intelligence to evaluate a continuity from the past to the present and towards the future. The static phenomena in the society are the glory of a particular civilization, technology or natural history. Static surrounding is the culmination of the dynamic surrounding which again through evolution leads to a new dynamic surrounding. Thus each environment is static in itself when perceived in its individuality but is also part of the dynamic surrounding when seen in the total perspective. In other words we may say that the chains of static environment lead to the formation of various series of dynamic environment. Museums pick up static facts from surroundings, which in unison represent dynamic facts.

All creations are the result of the materials available in the surroundings. Arts and aesthetics have been part and parcel of the creative urge of the human beings. The surroundings have channelised creation towards a particula path of growth and development. Sometimes the creations are identical in different surroundings, while on the other hand a variety of creations emerge from the same surrounding. Not only the arts and aesthetics but even the technological innovations in ancient times were based partly upon need of the situation and partly upon the total environment in which the invention or innovation was made. Later these innovations were adapted in different environments according to human need and the dictates of the environment. Many times the creations were so much suited to the particular environment that it was difficult to adopt them in a changed environment. Often such relative facts and creations become a matter of curiosity for people from different environments. Suitable examples in this regard are the ships, trains and sledges. These three means of transportation were invented for three different kinds of environments: sea shore, plains and hills. In India people living away from the seashore spend their whole life without even knowing what a ship looks like. If they see a model of a ship in a museum, they can visualize it. Similarly people living in some remote hill areas rarely get a chance to see the train. In modern times the physical surrounding is not changing at a fast pace but the cultural surrounding which includes the scientific and technological developments has a very fast rate of progress. This calls for greater responsibility on the part of the science and technology museums, to depict facts of the surroundings to the viewers in an understandable way.

Traditionally even if the museums were related to the surroundings the reference was in terms of the natural history or ethnography or the archaeological past. But all Museums are directly related to one or the other kind of surroundings. Very recently in Waterloo, a town in Ontario State of Canada, a big distillery museum was established. This distillery museum was established in Waterloo for the simple reason that for the past 150 years or more a distillery by name Seagram distillery is functioning in the area and the proprietors of the distillery in the family tradition have retained all the proto-types of the disilleries. Whenever a new technology for distllation was adopted, the old apparatus was carefully stored and this over the years has led to the emergence of a distillery museum. Based on the example above many more distillery museums may come up in future in different areas, wherever the dynamic environment of the technology is preserved. Utilization of the facts of the surroundings created by man or by nature is essentially through the exhibitions.

Exhibitions: A prologue to any exhibition is the collection. The collection is based upon the utilization of the facts of the surroundings. The functioning in the museum is flexible, but the common base line all the museums have, is the collection. The collection and exhibition in parts of the same are the two intermittant factors common to all the Museums. By and large, the works collected in any particular museum are the artefacts of the workmanship of various creators: the artists, the craftsmen, the technologists etc., or else the creations of nature and the explanation of the phenomena occuring in nature. Various kinds of museums thus collecting and exhibiting are Art and Archaeology Museum, Personalia Museum, Ethnographic collection Museum, Crafts Museum, Thematic Museum like Transport Museum, War Museum etc., Natural History Museum, Science and Technology Museum etc. The collections in these Museums are the attributes of various societies tribal, folk or urban or Nature at different levels of time. Since the inception of the first hand axe culture in the paleolithic times, there have been the impacts of natural calamities, technological developments which influence the surroundings to a great effect. Historical viccissitudes have also contributed to the destruction of civilization and cultures. With the passage of time, much of what had or has been admired for the distinctiveness is being discarded and replaced by Nature and Man.

The most important function of any museum is to conserve these artefacts in the best possible manner. Apart from this the functioning lies in the exhibition of the collection in an interesting manner. Morphology of the museum objects may vary from museum to museum but the fundamental concept of all museums is the same—the exhibition of collection in an understandable manner. Creativity is self-propagating, whether at nature's level or at human level. After propagation creation is modified thus changing the total form. What is created, is to be destroyed; this is the fundamental law of nature. This fundamental law, is the naked truth. Most of the religions and mythologies revolve around it. Museums at the fundamental level play a very important role in regard to this law of nature. Museums act as a bridge between the past and the present and are the pointer to future. As muscologists we must understand that we are all standing on the bridge which provides the important link of communication between creation and destruction. If collection is the link to the creation, the creator is also the link to the creation. Functioning of the Museum lies not only in collecting of the collection but also in protecting the creators; this new trend is seen, particularly in the Art and Crafts Museum, where the creators of fast disappearing arts and crafts, not in terms of the humanity but in terms of their creativity, are being looked after.

A collection or any set of objects is characterised by two main factors. Firstly the selection of the items and secondly by their combined presentation. The selection of a collection decides the function of the collection, If a person collects and does not display then it is hoarding but if the same person collects and displays then it is an exhibition. All museums whether historical, ethnological, scientific, thematic or of arts and crafts, exhibit a set of objects

Exhibition is the synchronised expression of the creativity manifested through various kinds of exhibits, at various levels and for different kinds of functions. Exhibits are the media of interpretation of any particular kind of phenomonon, technology (tribal, folk or urban), environment, or else art and culture. Exhibits are the creativities of man or nature, the part of collections of the museums, in various forms from crudest to the finest. Exhibition is a form of visual interaction through the exhibits between the viewer and the museum collection. Exhibitions are the communication media. The main purpose of any exhibition is the communication for the understanding of a phenomenon, event or an artefact at various levels. Thus understanding is an important concept related to exhibition.

Understanding: Understanding is a very broad concept and may include a wide range of levels, depending upon the awareness of the viewers towards the exhibits in particular and the museums in general. Understanding is a thought perception process. Frederic Kenyon has said "Museum exhibition illustrates written history and enlarges a man's conception of the possibilities of his race, so it plays its part in enlarging his mind, in multiplying his interest and in making him a good citizen." Awareness, sufficient information, thorough knowledge as concepts, which are the part of the broad concept of understanding—particularly in reference to the Museum. The understanding of the creations may be at three levels:

1. Recreation
2. Education
3. Research

The three levels of understanding are interrelated, that is to say an individual coming to do research in a phenomenon or object, may also feel relaxed while doing so in the Museum. Similarly students visiting the museum for the purpose of education may find some interesting topics worthy of deep enquiry and investigation, hence the research. Individuals visiting the museum to relax their mind may also have better knowledge about the exhibits after their visit to the museum and hence may also be educated. The broad outline of the understanding of the exhibition may be categorised by elucidating the visitors. Museums are by Man, of Man and nature and for Man. Here Man is taken in the complete sence of representing Homo Sapiens. The scope of functioning of different kinds of museums is such that they play a positive role not only in providing visual explanation of facts to literate, semi-literate and illiterate sections of population, but also contribute substantially in the academic sphere for better understanding which includes research into the facts. In any museum, exhibition is only a link between surrounding and understanding. It becomes necessary to make the display lucid so that apart from imparting knowledge it may provide some entertainment also. If the category of the Museum is such that the subject entailed is very dull and dry, attempts should be made to make it interesting with the aid of other accessories which include use of modern techniques of museum exhibition like visual aids, demonstrations, performances etc.

Education through recreative means is gaining more and more popularity as one of the ways of nonformal education. The explanation of the photosynthesis process in a natural science museum or else the demonstration of the craft technology in the Crafts Museum are the aids added as the part of the museum exhibition for education through observation and recreation. When we talk of understanding of the museum exhibition in relation to education, reference is generally to the schools and the universities. These institutions of learning provide the formal education which has become a part of the system in modern society. Legacy of education in the museum and through the museums is not an attack on the present system of education but simply like a catalytic agent. It is aimed towards the better understanding in unconventional nonformal way. Museums do not advocate closed systems, but always encourage perception of the originals. Particularly in regard to the natural history museum or the ethnographic museum, the aims are to let the students visualize what they study in the classroom. In the classroom of a middle or a primary school, the student may be shown photographs, charts, slides of various animals and plants, but he may not visualize the size, etc. through these medias. When the same student is taken for a visit to a natural history museum and shown the plant herbarium or animals, he may visualize to a great extent their proximity to nature although the best way he may be educated is when he goes to nature. A second way may be that a student goes on a tour and discovers a good number of plants and animals which he might not have seen in his own immediate sphere of interaction. After the tour he may like to gather more knowledge about the queries in his mind, for which he may find answers in the museum. Museums are not part of the system of formal education but a part of the total system of learning. Museum as a research institution has two functions. First before imparting knowledge to the masses, it is very important that the Museologists acquire the best, thorough knowledge regarding the exhibits, of collections of their own museum. This requires proper understanding of all the collective facts through the objects and also through the literature. Thus the museum curators should not only be custodians of the treasures—cultural, natural or physical—but also be scholars. The second level of understanding through research is for the persons inquisitive of acquiring the knowledge for the deep explanation of the facts in relation to the other phenomenons. Researchers thus are not so much interested in the exhibitions as in the collection. Exhibitions only help them to provide the brief outlines of the collections.

While the collections are the main source of the research materials, outcome of the research at both the levels is the publication of the materials. The publications can again be of three types viz. recreation, educational, and research. The museologists as researchers have to bring out publications which may be useful for all categories of the visitors to the museum. Persons who visit the museum for recreation will naturally be more interested in receiving the published material which may supplement the knowledge acquired by seeing the exhibit. Several leaflets, brochures or pamphlets are the published matter brought out by the museums. Publication of the facts gathered from thorough research are the materials which provide explanations of the facts and also are the research materials for further investigations.

Since publication is an important part of understanding the museum collections, special emphasis should be laid on including all the museum collections in one form of publication or the other. It is mainly for a better understanding at various levels that the new trends in the museum advocate for the additional methods, the pictorial representation or a commentary, which are the aids ideally conceptualised for better understanding of the artefacts.

So far we have discussed different concepts related to the word museum with reference to Man's utilization of surrounding through exhibition for the understanding. The last word another 'M' is refered to here as the "Mankind" (Masses). Museums provide an understanding of the environment in relation to man, for the mankind i.e. the masses—the people who visit the museums with certain specifications and purpose.

Mankind (Masses): All the functions in the museum are directed towards the masses. Masses form the most important entity for the museum. Without the masses—the viewers—the existence of the museum becomes insignificant. Thus to make the existence of the museum significant, care should be taken to note the degree of communication achieved through exhibits and how much of information has been grasped or retained. The grasping or the retaining power may partly depend on the capability of the viewer but it is also controlled partly by the manner of communication. Viewers are the public at large. The common variable these viewers have, is the fact that they are human beings. But still broadly speaking there are categories of visitors, who prefer to visit a particular kind of museum. In a metropolitan city, this choice is widely provided. A person may choose to visit an Art and Archaeology Museum, or Science Museum or Crafts Museum or else Natural History Museum. The Individuals interested in knowing about the scientific facts may visit the Science Museum. Those interested in Arts may go to Art Museum and children may preferably go to the children's Museum or Dolls Museum. But the popular museums at state level have all aspects of museology under different sections in one main building. In smaller towns there may be only one or two museums of one particular kind and these cater to the needs of larger masses. Such museums may be part of an archaeological site or a historical monument. All these different situations require naturalistic evaluation, which according to Nair (1983) refers to procedures that attempt to capture what actually occurs in Museum settings.

Traditionally according to Watson Laetsch (1979)[2], there are two cultures in the Museum field. There are some people who only care about artefacts and there are others who think artefacts are only important in the context of people and ideas. Essentially people are the common factor, whether as the curators or as the visitors. Curators in one situation may be visitors in another situation. Modern trends in Museum study give more weightage to the second category. When the artefacts, the creations or the phenomena are related to the people for understanding and the surrounding, it is necessary to accept the new trends of evaluating the exhibitions both before and after they are exhibited. Evaluation is to be used as a tool for improving the museum with the help of the masses. Evaluation does not only provide the feed-back for knowing the success or failure of an exhibition but if used with foresight may help to improve the presentation in the museum as a whole for the future.

To conclude we may say that Man's utilization of the surrounding refers to the birth of the Museum, while the exhibition and understanding relate to the functions of the Museum. The whole effort is guided towards mankind. The synthesis of the word museum in itself relates to the generalised gross aims and prospects of the Museum and explains the gross functioning of the Museum as an Ideology.

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Multiple Dimensions of the Ethnographic Museum in Multi-Ethnic Society

A.K. DAS

The present paper envisages the role of the ethnographic museum in the contemporary socio-cultural situation, which South-East Asia in general and India in particular is experiencing, due to the development-oriented politico-economic motivation. To be specific the process of industrialization, modernization and urbanization has induced a massive geo-ethnic dislocation leading to a profound disorientation in the life of the people and its value system.

India maintains a multi-ethnic, multi-lingual and multi-level population composition from the earliest time. The general notion about its ethnicity is as significant as its linguistic and religious bonds. When one studies the inter-relationship of the ethnicity, language and religion one confronts with multiple cultural dimensions, which are shaping the destiny of the composite civilization of the country. This is one side of the coin while the other side highlights the process of cultural-homogenization propagated through national policies such as "national integration" and bringing marginal groups into the "main tream of national life". The recent emphasis on the cultural concept "unity in diversity" is directed towards cultural-homogenization. This concept reflects more about the "composite nature" of our heritage. This is the significant aspect of our cultural reality.

The question of cultural development of late has occupied the minds of policy makers. There is no doubt that this aspect is intricately connected with socio-economic development and is a vital aspect of social change. It is quite apparent that economic development is the primary cause of social change and inroad of new values and ideals. In the past little attention was given by the policy-frmers to infuse a change which was conducive to the cultural environment of contemporary society. However, recently, that there is a "cultural component in all the section of planned development",' has been recognised. The important question of 'cultural development', which was once neglected, has now brought new dimensions in the entire planning process. It is quite apparent that the forces of change have been encouraging 'commercialized mass culture". This is a kind of neo-cultural mobility projected towards a new kind of homogenization. The earlier notion regarding cultural diversity is now losing its ground due to the process of homogenization. It has generally been accepted that there should be a concerted effect to preserve the rich cultural heritage at this stage. And the question of development of culture should be attuned to the ideals and values of contemporary society. All these lead us to a single point, i.e. the question of redefining tradition.

The preservation and revival of cultural peculiarities and traditions in the context of contemporary development programmes appears to be counter-productive and irrelevant. It would not be advisable to leave aside this aspect of culture-history as useless and unprofitable. The cultural policy-making body has now recognized that there is a need for reorientation of cultural planning. It has been the view of policy-framers and scholars that the "preservation of cultural heritage" should be complimentary to the question "development of culture".

These are some of the multiple-dimensions which the ethnographic museum confronts in the contemporary Indian situation. The identification of the multiple-dimensions ultimately uphold the necessity of concept-oriented plans and programmes in an ethnographic museum.

Most of the existing ethnographic museums are oriented in the 19th century colonial policies. Bulk of their collections are from the 'primitive' cultures which are on the verge of change. The techniques of displaying the objects in an extoic manner has not yet been discarded. Two hundred years of continuing change in the life and culture of the tribes and the peasents are yet to be incorporated in the presentation.

The socio-cultural problems discussed above are the clues for opening of new vistas in the realm of the ethnographic museums. The ethnographic museums have a new role to play while keeping a balance with the changing situation. A time has now come to abandon its colonial outlook and give a sense of direction. The concept-oriented programmes have to the formulated for immediate execution. Some of the socio-cultural problems already encountered may form the basic conceptual background for the new generation of the ethnographic museums. There is no doubt that these concept-oriented museums will be focussing on the multi-dimensional view-points. As for example a visual presentation conceived and devised on the theme 'National Integration' have to bank upon the theory of cultural homogenization. Whereas the concept based on the preservation of culture would definitely highlight the aspects of cultural identity and pecularity. These two themes, therefore, would be the focal point of two opposing realities.

It would, therefore, be necessary to categorise at this stage and redefine the objecttves of ethnographic museums keeping in view the broader national prespective. A three-tier policy have to be evolved to delineate the conceptual background of these museums in the framework of the theory 'Unity in Diversity' propounded by Bose (Bose, 1961).

1. At the grass-root level there should be the small ethnographic museums

such as the state and district-level museums, museums attached with the tribal research institutes, certain private museums having uni-cultural materials. The conceptual background of this category of museums should be based on cultural diversity. That means the collection policy, presentation and other strategy should be framed to uphold the policy on the preservation of culture, laying emphasis on the cultural identity and pecularity.

2. In the second category we may consider the ethnographic museums of regional significance. Here, to be more specific, the museums of the Anthropological Survey of India, a number of museums of university departments and government sponsored museums having multi-cultural materials representing a particular region would come under the purview of this category. The regional cultural homogenity may be the focal point and conceptual background of these museums and its policy may be recasted accordingly.
3. At the National level a limited number of museums should devote and mobilize its entire resources to focus the aspects of cultural unity. Consequently these museums would pay some attention to the question of social change and the cultural development as a corollary to the main conception.

All the three categories of museums are, however, conceived to serve the community as a complimentary whole. At the grass-root level one can not ignore the vital question of ethnic identity and hence emphasis is to be laid on cultural diversity, while cultural homogenity is equally important, if not more, at the regional sphere. Finally, at the national platform the search for unity in the realm of culture is more important than the already established fact about the diversity. The aspects of social change which is intimately connected with the problem of cultural development, in fact, run parallel to the concept "unity in diversity". It is high time to recast the existing plans and programmes of all types of ethnographic museums according to the policy discussed above. It will give an opportunity to mobilise the entire resources to uphold the overall National objective.

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Exhibiting Coins in Museums

SUNJAY JAIN

Introduction

Numismatics has the potential of being one of the most important keys to history. It verifies, modifies and even amplifies history by furnishing true information regarding the issue and his or her preferences. To a considerable extent the political and economic history of an ancient country is constructed mainly by the numismatics evidence. It also throws interesting light on religion, culture, administration and artistic and aesthetic tastes of the people of the times. Many facts regarding historical geography, trade routes and commercial links are revealed to us by the data on the distribtuion of coins, but unfortunately it is so little known outside the coterie of numismats that an average educated individual hardly knows the importance of numismatics in historical reconstructions.

If we want to popularize numismatics, it can effectively be done through museums. But, display of coins give rise to many problems. In this paper, I have tried to evaluate the existing methods of display and their problems and also present a few suggestions for effective and educative display. The foremost problem is the relatively small size of coins with shallow relief and fine details; because of this their details usually escape notice. Secondly, coins have two sides and both need to be shown in most cases. Coins meant for specialists ought to show both the sides invariably. On the other hand if coins are displayed for laymen or children greater emphasis have to be laid on portraits, emblems, legends, their intrinsic worth and historical significance etc. Besides, display of coins struck in gold and silver requires special security measure and most museums cannot afford to have adequate means to ensure their safety.

Exhibitions

To pique the curiosity of the visitor a short orientation item should be introduced in a corner near the entrance to the gallery. It may include Film and Slide shows and, popular lectures apart from explanatory exhibits to teach the public to understand and appreciate the proper study of coins. An animation Film like 'Romance of Indian coins' prepared by the Films Division can expose the theme of coins in a very amusing manner. Colour transparencies or enlarged photographs of models may be used to highlight important coins displayed in the gallery. Apart from this the visitors must be provided with some kind of carry away information, i.e. booklets, brochurs etc.

To sustain the interest thus created various aspects of numismatics have to be focused in permanent, temporary or special exhibitions. Permanent exhibition depicting the evolution or story of coinage from its far off beginnings down to the present day is very essential to give an overall view. This should consist of a museum's unique and rare coins representing all historical periods. As exhibitions in public galleries are arranged for all kinds of people, recreational aspect should also be combined harmoniously with interpretative and aesthetic ones. For instance, diorama of a mint where coins are being produced or the container and a few coins of a famous hoard and depiction of the circumstances under which it was discovered is bound to generate considerable interest. Similarly exhibits on 'Contemporary fake coins', 'Error coins', 'Coins of unusual form and size' and 'Unusual uses of coins'—to name only a few—can be quite interesting.

To supplement permanent exhibitions certain other themes can also be presented in numismatic display; for instance, techniques of Minting Coins in India, Birds and/or animals on Indian coins, Representation of Arms on Indian coins, Deities on Indian coins' and so on. Such exhibitions will be of great interest, not only to scholars but also to general visitors who will be tempted to visit the museum again and again. In the National Museum of History and Technology, Washington, coins are exhibited on the theme of 'Hair fashion on coins'. Such themes are very interesting and attract all kinds of people.

Apart from the exhibitions exclusively for coins, coins can also be presented along with other artefacts. For example an exhibition on 'Peacock in Indian Art' will include coins, paintings, sculptures, textiles and other materials of art and craft on which peacock is depicted as one of the motifs. This type of display focusses attention on a common factor such as motif, design or theme represented on a variety of material, of the same or different place and period. Gupta gold coins were included in the exhibition 'Games and sports in Indian Art' organised by the National Museum, New Delhi, on the eve of IX Asian Games. Another interesting example is of Saran Rani Musical Gallery, National Museum, where an enlarged photograph of a coin of Samudragupta playing *vina* is exhibited.

For the public which does not come to the museum mobile exhibition can be of immense help. Mobile exhibition is a very dynamic form of the medium of communication and ensures tremendous possibilities to bring the message to the masses. However, to maintain a museobus—rather very expensive and only a few large museums can afford. Salarjung Museum, Hyderabad has become a pioneer in arranging mobile exhibition on Indian coinage recently. Museobus of National Museum mounted with an exhibition 'Architects of India's Glory' exhibits enlarged plastercasts of coins with portraits of some of the Indian rulers.

Problems pertaining to the display of coions

I. Visual Problem : Coins are small objects often with fine details and low relief; because of this they usually fail to attract and hold the attention of visitors. Certain visual elements must therefore be added to cover this limitation. Lighting, colour and texture of background, and scale of the coins in relation to the space are other vital component parts which require careful and judicious consideration. Let us take them one by one.

(*i*) *Visual aids*

These may consist of photo-enlargements of coins or large sketches or drawings showing the principal features of coins. For instance, if these visual aids showing the portraits, motifs, arms, costumes, etc. depending upon the theme of the exhibition, are placed by the side of the coins, the visitors will be motivated to see it more carefully and it will be easy for them to understand the details on the coins. However, it does not mean that the whole exhibition should be overloaded with these visual aids. They can produce good results if judiciously used. In the Museum and Picture Gallery (Baroda) coins are exhibited alongwith enlarged photographs of obverse and reverse views with good effect. A very elegant and exemplary method to give an idea of the personality of the issuer of coins is employed in the Central Museum, Indore; miniature portraits of Mughal rulers along with their coins are displayed.

Other aids conducive to a successful and meaningful presentation are texts, maps and charts indicating the extent of empire of issuer of the coin, various mints, distribution of coins, their weights and sizes, transliteration of legends and genealogy.

(*ii*) *Lighting*

Coins have very low relief, and therefore proper lighting must be used to bring out their fine details. Oblique lighting from a source such as a spot light can turn coins into a wealth of features. To control the distance of coins from the source of light, the surface on which coins are displayed can be slightly inclined or curved. Elimination of reflections in the showcases can be done by tilting the angle of the glass.

(*iii*) *Colour add Texture of Background*

Colour and texture of the background also requires careful and judicious consideration. It is worth taking trouble to put background colour and texture of the coins; putting colours and texture together is a matter of individual taste, but in general strong contrasts should be avoided. Coins of gold and silver may be shown against a background of blue or light black velvets. The softness of the velvet will accentuate the hardness and richness of gold and silver. Copper coins can be shown against dull coloured fabrics with equal success.

(*iv*) *Scale*

Scale of the coins in relation to the space in which they are exhibited also needs careful consideration. A small coin displayed in a big showcase shall remain unnoticed. Therefore showcases showing coins should have appropriate dimensions to enhance the size of the coins.

(*v*) *Movement*

The movement in the exhibition is another element which can attract the attention of visitors by breaking down the monotony of static nature of exhibits. Coins accompanied by informative aids can be displayed on structures which rotate on an axis. The movement may be continuous or start or turn off with the pressing of a button by a visitor. In the National Museum of History and Technology, Washington, coins are displayed on a conveyer belt which moves slowly.

(*vi*) *Using Magnifying Glass:*

Magnifying glass can be very effective in order to overcome the visual difficulty. It is neither possible nor desire to provide each coin with a magnifying glass. A showcase of coins can be provided with one magnifying glass which can be used as and when required. The National Museum has designed for the special exhibition, a fixed and rotating arm fitted with a mangifying glass which can be adjusted at any particular coin.

II. Showing the both sides of the coins: Regarding the visualisation of both the sides of coins various methods have been experimented by different museums. In the National Museum, New Delhi, mirrors are placed behind the coins so that the reverse side is seen indirectly in the mirror. But in this system there is a drawback that one cannot read the legend, if there is any. To overcome this difficulty double mirror arrangement can be made, as has been done in the State Museum, Lucknow—here the reverse side of some selected coins are shown. In this system it will be difficult to examine the reverse side of the coin closely because the final image of the coin is made at a distance. Another problem with mirrors is that the image of the viewer is also seen alongwith the coin.

The Fort St. George Museum, Madras, exhibits some of its medals placed in holes cut in a perspex sheet which is then squeezed between two glass sheets held vertically which revolves. This arrangement can be employed to exhibit the coins. This method is however not very satisfactory because both sides of a coin cannot be viewed at the same time. Secondly, it will require much more space to arrange the whole gallery. There is still a serious problem of die-alignment in all the methods discussed above. In large number of cases while the obverse side will be in upright position, the reverse side may not be so.

The best solution seems to be to juxtapose two similar coins of the same type. In case two similar coins are not available, electroplated cast coin can be used to show the reverse side or less important side.

III. Security : Security is yet another problem which must be taken into consideration while exhibiting gold and silver coins. Steel framed strong showcases fitted with bullet-proof glass are indispensable to the exhibition of gold and silver coins. Additional security can be provided during close hours by using securely locked steel rolling shutters or sliding doors. Electronic appliances and devices like close circuit TV, Burglar Alarm, Sound Alarm, Glass-breaking detector, Vibration detector, movement detector, etc. can be used if resources permit. In the absence of adequate security measures, electroplated metal casts of coins shining with the original colour and lustre of gold and silver may be displayed in public galleries.

To secure coins against damage all the material used in the making of showcases including background cloth etc. must be chemically inert. In no case coins should be fixed to their background by any adhesive as it is likely to cause damage to the coins. In order to hold the coins in position in exhibition cases D.W. MacDowell has very rightly suggested to rest each coin on a small prespex ledge mounted on a slightly inclined background.

Conclusion

At the end, I would like to observe that it will be hazardous to think of some techniques which will be effective in all museums. There are no universal methods which will guarantee suceess; for, there is great variety in the visitors for whom such exhibitions are meant and, much variation in the size and the themes of the exhibition. Therefore, techniques and methods that may be suitable for displaying coins will have to be adopted and adapted to suit the requirements of time, place and visitors, the occasion and the theme.

Anthropological Collections with Special Reference to Ethnography

U. Dass

Anthropological collections include physical anthropological materials, pre and proto historic artifacts and ethnographical objects associated with biological and cultural aspects of man during pre and proto historic periods as well as contemporary times. The study of the anthropological collections in museums provides the evolutionary diversity in nature and successive stages of man and his cultural activities in time and space. The source of the original physical anthropological materials and pre and proto historic artifacts in museum is very much restricted to either exploration or excavation, therefore, the direct scope to the display of the originals is limited, though the indirect scope through replicas together with well documented photographs, models, charts, maps and graphs is unlimited. Inspite of having wide indirect scope these collections are not gaining prominence in anthropological museums in India.

The scope as well as the source of ethnographical objects are multifarious as it deals with living contemporary cultures. India is a multi-ethnic country where about 80% people live in villages in different ecological conditions with their diversified cultural traditions. The traditional activities of the tribal and rural people are expressed by art objects and therefore objects of tribal art and folk art are found in substantial quantities in India.

In order to fulfil the aim and objective of an ethnography museum its permanent collections could be made from three different sources namely gifts from private collections, purchases either directly from the market or dealers through Art Purchase Committee (A.P.C.) and scientific collection through purchase by field work. Besides, two other sources may also be mentioned here namely loans and exchanges from different museums or private collections, these, of course have a little significant bearing on ethnographic collections.

The gift objects provide little scope for scientific documentation as their context, provenance and genesis are generally not recorded. The purchases from the dealers through A.P.C. are relatively useful than the gift objects, as such purchases are made by specialists and accompanied by carefully prepared index cards. Both the sources can help to fill up the gaps in the collection to some extent but no ethnography museum could stand on these two sources due to the lack of basic and original data of its collections. Objects without relevant context will always remain dead in the museum. It is the context which gives life to the object by virtue of which it speaks about its culture. This context which is the basis of understanding could be brought only through the third source i.e. collection through field work. The collection by field work provides ample scope for compararing culture and data in regard to these objects. The collection can be made with the help of carefully prepared schedules. The acquisition of objects and information in regard to their cultural context is only feasible through field works.

The growth of the ethnographical collections for the development of ethnographical museums began in the nineteenth century during the British rule. Since the inception of the museum movement in India the colonial administrators were attracted by the diverse cultural traditions. They paid considerable attention to the study of heterogeneous tribal than folk cultures. The collections made were mostly selective and for aesthetic self-appeal but superb in nature. Collections worth mentioning are from scholars such as Thurston, Foote, Breek, Manley, Rea, etc. These collections were acquired in 19th century and preserved in the Govt. Museum, Madras. In the twentieth century, Dr. Verrier Elwin's collection was acquired and preserved in the National Museum, New Delhi. All these collections have great importance in the field of ethnography.

The need to collect ethnographical objects from the field arises from the fact that since independence tribal and folk cultures have undergone vicissitudes which have affected their society as a whole. The causes for this phenomena are industrialization, urbanization, improved communication, constitutional safeguards and rural development, the resultant effect is the socio-cultural change. The rate of the interaction of these causes and effects is so rapid that it resulted in the decline or disappearance of their traditional arts or crafts in different degrees. Unless we document the traditional cultures and preserve them in museums for the posterity at this stage they would disappear for good.

Most of the ethnographical museums in India are lacking in essential data inspite of having large collections. The value of the ethnographic collections depend not on the quantity of objects collected but on the quality of data collected. Therefore, before collection of objects from the field thorough planning is required. For this purpose a check list of objects may be prepared as to the requirement of collection not only to fill up the gaps in the collection but also to enhance collections for representation of more cultures. Once the area and community is decided, then a working list of objects may also be prepared with the help of reference books, monographs, district gazetteers and census reports so as to find out what sorts of local objects may be available in the areas where the collection project is intended to be undertaken. Both the check list and working list of objects will be helpful in the field as aides for obtaining objects and data. For the collection of data a field data schedule may be prepared carefully and conveniently in a comprehensive manner in consultation with NOTES AND QUERRIES IN ANTHROPOLOGY (1951), Borhegyi (1965) and Dudley and Bezold (1968) and get the same cyclostyled as per requirement for recording the data on its relevant columns. A schedule is meant for one object only. The sketches or diagrams may be done either on the reverse side of a schedule or a separate sheet may be used for the same and the different parts of an object should be labelled in local terms. A field diary may also be maintained while recording the basic data on the salient features of the land and the people, their origin and history of migration, material culture, social, religious and political organizations etc. for the preparation of a monograph. For this purpose case history method may be followed and observation could be made either by participant or non-participant observations.

In the field, the investigator or collector may have to adjust to the new situation. In order to cope with it rapport must be established with people and authorities of the locality. The collector has to show sufficient interest and appreciation to their objects of art in order to create goodwill, by virtue of which it will be then easier for him to collect objects, data, photographs and recording of songs etc.; otherwise, the mere aim and objectives of the field mission will be in vain. All the objects thus collected should be temporarily numbered on small cards and tagged with the object. Accordingly a fresh list of objects may be prepared.

Objects of smaller size and shape may be collected in the field as these are easily transported. For objects of bigger or larger size and odd shape such as houses, boats or canoes etc. small scale models of the full size originals may be prepared and collected. Similarly a photograph may also be obtained in case of sensitive religious, ritual and mortuary objects. Fragile and unstable objects namely fruit pluckers or digging stick made of bamboo or ordinary wood, umbrella or hat made of green vegetables or leaves should not be collected. Such objects can never be preserved with any suitable preservation or care. Likewise objects or non-local forms and styles must be avoided for collection. But the original objects which could not be collected due to above mentioned reasons must be photographed. Sometimes it happens that the owner of an interesting and rare object is unwilling to part with it due to sentimental reasons; in such cases also the photographs must be obtained. Besides, photographic coverage of fairs and festivals, dances, ritual and religious ceremonies etc. should be made while considering the material aspect of a culture for photography, emphasis may be given in order to document the technological and functional aspects of objects. A field catalogue of photographs should be maintained at the time of taking photographs. If possible oral traditions in the field of performing arts must be recorded on the tapes and its English version must be noted on the field diary.

Moreover, when any doubt or confusion arises about the authenticity of the material origin of any object or its parts, the sample for the same may be collected for expert opinion. Before and during packing and forwarding all the collected ethnographical objects in the field may be preserved with paradichlorobonze and silica gel. Sufficient preventive measures may also be taken while packing with plenty of shock absorbing materials such as paper, hay, cotton, wood wool, thermocol etc. and moisture resisting materials such as polythene or alkathene and tissue papers etc. against breakage and humidity respectively. Breakable objects may be well stuffed and must be kept in one box and not with any hard objects so as to avoid friction.

In this way by paying a relatively short visit an excellent collection could be acquired with accompanying valuable data, photographs and recorded tapes on the context which will eventually help in putting up an illustrative exposition on the documented cultures.

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Indian Museums and the Public

M.L. NIGAM

After independence in 1947, there has been a dramatic change in the socio-economic condition of India—An unprecedented scientific and industrial progress and the great technological break-through have not only raised the living standard of people and improved national economy but also have brought a remarkable change in the outlook of Indian society. At the same time, the large circulation of money, the improved means of transport, the new national consciousness and love for their cultural heritage have immensely increased; these inspire Indian masses to visit the ancient monuments and museums throughout the country. Everyday, the large crowds of people and school children pour through our museums and this casual public is liable vastly to increase in coming future. Hence, the relationship between the museums and the people in the present circumstances must be examined afresh.

Till the middle of the 20th century, Indian museums acted more as store-houses to collect, preserve and interpret specimens of material culture of the past for a handful of scholars. The idea of public service and museum-education was little known to them; as a result, a number of scholarly publications were brought out which throw adequate light on the history and culture of the bygone era. Yet, there was no scope for the common man to derive benefit from these public institutions. After the dawn of Indian independence, it was realised that the Indian museums must serve the cause of all people, irrespective of their age-goup, social status and academic background. As a scholar rightly puts it, "Museums are a service, run by people, for people, and their continued existence can only be justified in these terms[1]". This new concept and ideology requires a fresh thinking and approach to define the functions of museums in relation to the public of modern India.

It is, therefore, time to pause and ponder about the usefulness of our modern museums. How far have we succeeded in achieving this above ideology? How far are the modern museums of India really effective in their service to the Indian masses? Or Do we still stick to the traditional approach about the functions of our museums? These questions, no doubt, need a good deal of heart-searching and throw open a challenge to those who serve in the museum profession in India. Any slackness and indifference on our part will adversely affect the museum-movement in the country.

It need not be over-emphasised that the museums of post independence era in India have received enough support and sympathy, both from the government and the people. There has been a considerable increase in the number of museums of all types, i.e. history, art, archaeology, ethnology, health, science and industry etc. which are meant to serve all sections of the society. The old museums have expanded. The public munificence is also forthcoming gradually by way of gifts and loans. Both the Central and provincial governments are allocating funds, according to availability, to expand and develop the museum-movement in India. In other words, the new existing conditions and circumstances are quite favourable and conducive to the growth of museum movement in India. Still, the Indian museums are far from the desired goal. What can be the reason for ineffectiveness of our museum programmes and public service? Why our museums are unable to cope with the changed social circumstances?

To my mind, the fault lies in the basic approach and functioning of our museums. Firstly, Indian society is undergoing a fantastic change in its outlook and structure, whereas our museums are unable to shed off the age-old traditions and functions which were formulated under the British rule with a specific purpose in mind. The museums of the British India were meant to know more and more about our ancient past in order to understand the Indian mind, customs, manners, myth and philosophy which helped the alien power to establish themselves firmly on India soil. The idea of public service was not there. Hence, the functions of Indian museums during the British regime were object centred, which laid more emphasis on objects than on people. It was only a handful of scholars and researchers who utilised the collections and derived benefit from the Indian museums. The Indian people in general remained unconcerned with the museums and art galleries.

The object centred policy of Indian museums of the past has made us so much blind by devotion to the museum specimens in our collections that we have forgotten that the objects by themselves lack complete meaning, significance and value except in the context of their usefulness to people. We tend to forget that museums exist not only for scholars alone, but for all people.

It is in no way intended here to minimise the importance of scholarship in Indian museums which is so essential. Yet, museum scholarship is the means and not the end and it must be utilised for the benefit of all people. This is possible only through well conceived educational programmes of our museums. The task of scholarship is to study the past and link it with the present but it is the museum education which will take the results of scholarship to the people and open them for debate. The museum objects, therefore, must be utilised as tools to create ideas and affect the minds of the people.

Before we discuss this theme further, let us also take into consideration the changing social pattern of developing India. As a result of the great scientific and industrial progress, Indian social pattern is undergoing a rapid transformation. In view of the large population of India still being illiterate and poor, the power of decision making and resources are centralised in the hands of a few industrialists, bureaucrats, technocrats and specialists. The other segments of the society are still struggling for their right place and identity in modern society. In fact, it is this down-trodden section of the society which needs be strengthened and enlightened in order to create a balance in our social structure. Museums should, naturally, be more concerned with this class with a view to raise their living standards and bring them nearer to the main-stream of our National life. *Yet, museums are governed and controlled mainly by the bureaucrats, administrators and specialists who, knowingly or unknowingly, would not share their age-old reservations and privileges with the common man. Thus, there is a danger of continuing the sociological and cultural imbalance in our society.*

To cite an example, let us take the case of modern art in India. During the post-Independence era, there has been a great awakening in art-field and the modern Indian painters and sculptors are adopting a different language of art with new symbols and motifs which are not familiar to Indian eyes. With the result, the Indian masses are totally cut off from the new art, and artistic traditions. An average man neither understands the new language nor symbolism of modern art. The spokesman of modern art in India, however, assert that their art is meant for those who can understand and enjoy it. It is in no way their responsibility to teach masses about their art. This has created a new cultural oppression where the bulk of Indian population is deprived of their deserving right to know and enjoy the new art trends and creations.

The museums of India lie in between these two extremes. The modern concept declares museum to be public institutions. How can museums justify their existence and the public funds, which they utilise for their growth, unless they serve the masses, the grass-roots of our society? It is, therefore, the bounden duty of Indian curators and other staff of Indian museums to maintain close links with the specialists, scholars and technocrats with a view to gain from their new researches and inventions, on the one hand, and dispense this knowledge to all sections of the society, on the other, through their varied and meaningful educational and cultural programmes.

It is, thus, high time that Indian museums revise their policy and programmes in accordance with the changed social conditions. They must open their reserve-collections to specialists and research scholars so that they study and find out answers to various new sociological problems through their educational programmes for the benefit of the general public. All researches on museum collections must be result-oriented. Any research, which remains unaccountable to people, has little relevance to modern society.

Another potential danger, which one can see in the development of museum-movement in India, is that of too much professionalism of Indian curators who vie with each other in following alien methods and techniques blindly in the name of modern museum-methodology. We have still not realized that the Indian climatic conditions and the museum clientele are very much different from those of the western countries. Our museum collections, due to our vast cultural heritage, are too large and diverse and our financial resources and technical expertise are limited as compared to those of the western museums. The bulk of Indian population is sitll illiterate and poor. Too much professionalism based on alien traditions and experience where people are literate and mentally alert, on the one hand, and our age-old bias for scholarship on the other, offer only one way communication where ordinary Indian visitors are left with the role of passive spectators. The common folk are, thus, deprived of their rightful place and active participation in formulating the educational programmes of our museums. We forget that it is the active participation and self-experience which attract and motivate people in creative cultural activity.

The last but not the least, is the problem of the new increased casual public to Indian museums. Who are the people coming to our museums? What are their ideals and aspirations? What are the socio-cultural needs of the people in the changed circumstances? Not a single proper country-wide survey has been attempted by Indian museums to understand the people's behaviour and the changed sociological pattern of developing India. The age gap between the old and younger generations, which finds reflected in their thinking and attitude towards life, is also vital to guide in planning the policy and programmes of modern museums. Why should we take it for granted that all educational and cultural programmes planned within the four-walls of museum by specialists and educationists will be acceptable to all segments of Indian society? How do we expect involving the public directly in our day-to-day museum activity? All our intellectual approach and sophisticated strategy, which is the basis of the present day museum educational programmes, is a sheer waste of time and energy. On the contrary, such out-dated, traditional approach not only creates the cultural distance but also generates suspicion in the minds of the village-folk who watch them from a distance as fun-fare for temporary enjoyment. At the same time, the educated young-folk consider them meaningless and irrelevant to their present day needs.

Besides, the new types of specialised museums pertaining to science and technology, agriculture, ethnology, health and natural history should be developed and the old ones expanded to meet the new dangers posed by the rapid industrial growth and urbanization. Due to the fast development of science and technology in the country, there is a large exodus of population from the rural areas to urban centres. Hence, the dangers like the total extinction of the village industry aligned with the indigenous arts and crafts, the new problems of health hazards and environmental pollution are emerging with devastating effects. It should be the prime responsibility of specialised museums devoted to art, ethnography, health and applied sciences to undertake specific research-programmes linked with the aforesaid problems in close co-ordination with the local universities and other sister institutions to find suitable solutions to these new problems and transmit the same to the masses through their well-thought-out, meaningful educational programmes. This will bring the Indian museums nearer to the national stream and provide them with an opportunity to render more purposeful service to the community.

Hence, the greatest need of the hour is to plan well-thought-out various sociological surveys with the help of professional organisations in the country to understand the behaviour of the so-called casual public coming to our museums, to know their fresh socio-economic needs under the changed social circumstances and formulate concrete proposals to guide our future educational policy in order to make it result-oriented and purposeful. Moreover, the new museum activity and programmes must also vouchsafe direct involvement and active participation of the village-folk with a view to win their confidence and support for our museums. Active participation does not mean only attracting a particular cross-section of the society but it must force the visitors to communicate visually with the works of art while they are there.

Again, the easiest way to make Indian museums more effective and meaningful in the changed circumstances will be to take up the work of evaluation of all museum work. It is vital for the museum staff to scrutinise their educational programmes, such as exhibition and museum researches etc. at every stage to ensure that the things take place as planned or intended originally. This type of evaluation work is directed to pre/post-test of each and every museum programme in order to achieve the determined goal. As a scholar rightly puts it, "It is simply important to remember to ask why any particular study is carried out, what the author's or sponsor's intentions are, and how the study is to be used."[2]

At the end, we must not forget that the museums are run on the support of public money and if we ignore this public for the sake of handful of scholars, the future of Indian museums will be very bleak. The time at our disposal is limited and we must prove our credentials in the eyes of the general public to ensure the sympathy and support of all people. Indian museums must revise their role in accordance with the changed social circumstances. We must also devise new methods and techniques which will suit the Indian conditions and the people. The museums should utilise their collections and resources to serve the people as a whole; this will provide extra strength and momentum to museum movement in the country. As it has rightly been stated, "It is within our own power to make up the lost ground, but if we are to do so we must come out from the shelter of our collections and radically rethink our display policy in terms of people rather than specimens."[3].

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Environment Simulating and Environment Interpretive Exhibits

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The motto in the sphere of environmental action is: "Think globally but act locally." Same is true in planning environmental exhibits in Indian Museums. We may take interest in the manners in which such exhibits are conceived all over the world but we ought to produce such exhibits which will meet our own indigenous needs.

It is imperative that we resist any temptation to imitate the types of exhibits found popular and effective in museums abroad without giving a critical thought to their relevance in the context of our museum situation. In my opinion, the displays based on second hand ideas wil result in unoriginal, ineffective presentation and will appear as exotic or rootless in our museums. It wil fail to generate any worthwhile environmental action, concern or education. More pragmatic it would be to understand how we can serve the needs and expectations of our museum public. The first step in that direction will be to understand the nature of environmental exhibits as different from other kinds. This article is devoted to differentiate two subtypes of environmental exhibits which are named as "Environment simulating exhibits" and "Environment interpretive exhibits."

An exhibit attains a degree of being environmental to the extent to which it tries to universalise its subject matter. A non-environmental exhibit on the other hand does the opposite. For example, a non-environmental exhibit might specify, quantify, itemise, individualise, enumerate or differentiate objects or specimens and related ideas, concepts and information. Many good exhibits which are non-envirnomental, perform this important function in our exhibition galleries and it is not our intention to underestimate their importance. But it will be wrong to call them what they are not in the interest of clarity in museological thinking and action. Some are likely to confuse environmental exhibits with non-environmental exhibits because often the contents of such exhibits, in their subject matter and choice of objects and specimens, resemble very closely; but as we will see below, the basic difference is in the function and form of the two types. For example, the material usually employed to prepare environmental exhibits is also used to prepare "Comparative displays", "Systematic exhibits" or "thematic presentations", yet these are not truly speaking, environmental exhibits.

In the "comparative displays", we find objects and specimens juxtaposed so that their similarity or contrast can be studied at a glance by matching or differentiating their individual characteristics. The reason why they connot be considered environmental is because the attention is confined to pairs of comparable materials, individually or in groups. Such things are never related to their context.

In "systematic exhibits", the aim is to present them in taxonomic and classificatory order for the purpose of studying how groups are interrelated. Such displays facilitate the study of inclusiveness or non-inclusiveness of individual specimens or their groups viz-a-viz a scheme of classification. From such displays we may learn about generic and specific characteristics but without understanding the circumstances which influence their origin and development.

The "thematic exhibits" are topical, often motif-centred and oriented towards revealing episodes, legends, myths, events, tales, etc. which are shared in the form and content of the objects included in such diplays. They might be descriptive or narrative but tend to localise or circumscribe the spectator's interest to a single focal point and do not allow it to relate to any wider context.

In contrast, the environmental exhibits are designed to show objects and specimens with a view to revealing their origins, surroundings, habitats, circumstances, situations, milieu, in as many ways as possible. The reason why museums can and should organise such displays is that in many, if not most of their presentation, the objects are seen in relative isolation.

Only the specialist visitors who have the necessary background information can relate the displayed material to their respective context. Others carry away fragmentary knowledge of things. An antidote to this is to encourage "holistic" thinking about things so that all that is shown get interrelated in a total scheme of knowledge of the manifestations of nature and human achievement and also man-nature relationship in the past and present. For this, the environmental exhibition is the specific solution.

To be able to plan and prepare environmental exhibits, one should understand the various kinds of such exhibits so as to meet the variety of requirements not only of the different objects, or of visitors but also those arising out of different museum situations. The two basic types on which we are going to focus attention in this article are "Environment Simulating" and "Environment Interpretive" types. Both these kinds are closely related but are not certainly identical. Their differences will become obvious if we ask such questions as Why? What ? Where? for Whom? and How?

The Environment simulating exhibits have to create, reproduce some specific kinds of environment in the museum situation. The visitors should be able to respond to such exhibits in a direct, vivid, intense, personal manner. The justification for such exhibits is the possibility of vicarious experiences. An environmental exhibit has to serve as a substitute of "second best" to the original situation and it is fabricated in the museum because the original environment itself cannot be physically shifted into the museum. In contrast, environment interpretive exhibits need not simulate but are required to communicate environmental facts, information, ideas, concepts and show relevant objects and specimens.

The environment simulating exhibits must have everything in them to present the overall interrelationship of things in a natural or cultural situation particularly focusing on verisimilitude, likeness or semblance in appearance of such presentation in a museum with an actual corresponding situation elsewhere. The imitation should be convincing, credible, or believable and should induce the spectator to conjure up the image of the real one. The only difference between the environment simulating exhibit and its real counterpart is that the former will be synthetic, illusionastic, second-hand substitute available in the museum while the latter is beyond the museum's reach. Such simulated exhibits are not necessary in case of site-museams or "trail-side museums" where the open-air surroundings can be used for such educational work in which direct, personal, vicarious experiences are *sine quo non*. Reproducing such environments in museums is very expensive and should not be undertaken unless their charateiistic utilisation becomes an integral part of the institution's educational masterplan.

In contrast, the Environment interpretive Exhibits are devoted to several specific educational sub-tasks like definitions, explanations, elucidations, illustrations, exemplifications, annotations, applications, explorations, representations with a view to arriving, ultimately, at holistic understanding of natural and cultural environments. In them, objects and specimens are used selectively and certainly not in a manner in which they are found originally. Besides, the ratio, proportion, scale, co-relation amongst the selecd objects will be different in the two kinds of exhibits. Obviously, these will have to reinforce the illusion of a specific environmental situation only in environment simulating exhibit. But liberty can be taken in adjusting the scale for interpretation purposes as found in enlarged or miniature models.

If we ask questions like "When"? "Where"? "for Whom"? in connection with planning of the above referred two types of environmental exhibits, many requirements may appear similar. Some differences are, however, noteworthy. The duration of the expected visits will have to be sufficiently long where simulation is attempted and where vicarious expeiences are aimed at It takes time even for an interested visitor to stand, stare or walk slowly in front of, or within such large-scale exhibits and get absorbed in observing myriad webs of environmental relationships. Also sufficient space should be available to erect such exhibits. The areas should be without windows and continuous so that visitors can forget that they are in the museum premises and imagine themselves in some other situations. But this is not essential in environment interpretive exhibits which may resemble conventional displays. Regarding the target audiences, the environment simulating exhibits will be effective more readily in the case of laymen. Vicarious experiences are not possible if visitors take only intellectual interest when they are "matter-of-fact" or logical which is detrimental to illusion or make-belief. Hence, the visitors who are capable of projecting or extending their mental vision away from where they happen to be are likely to responed readily to the environment simulating exhibits. But, for the sake of inducing the other kinds of visitors to do so, some strategies will have to be evolved for "conditioning" them before they physically enter into, or arrive at the environment simulating exhibit.

It is in the "How" or formal aspects that the environmental simulating exhibits differ markedly as their form will follow their respective functions.

The environment simulating exhibits may be planned as very large "period rooms" or "habitats" or "dioramas" or "walk-through exhibits." These may occupy the whole, or a part, of a gallery. Isolated habitat groups, dioramas, semi-dioramas "mock-ups," in close proximity of interpretive exhibits will not be conducive to vicarious experiences. Life-size scale is very crucial but foreshortening techniques can be used on the periphery to economise space. Realistic painting will have to complement the three dimensional ensemble in environment simulating exhibits. In conventional habitat group cases and dioramas, the painting is on curved background. In large sized environment simulating exhibits, such paintings could be continuous on all sides or there can be a series of back-drops strategically erected to serve as extentions or continuity of some portions or zones in a gallery sized walk-through type of environmental re-constructions. Those will have to be co-ordinated to ensure their convincingly illusionistic effect. But there can be such large sized environmental exhibits in which neutral coloured backgrounds are used allowing the visitors to focus their attention on mannequins or dummies of human figures, in costumes, in action, with accessories and also objects and specimens related to the theme amidst certain "props" like simulated period architecture, huts, market surroundings, ateliers or work-shops. In such cases the typical exhibit is like a tableau on a raised platform with or without any background painting. We may also have combinations of realistically painted backgrounds with some neutral non-representational back-drops in the same exhibit.

The lighting in such exhibits is a very important element because it has to create an illusion of depth, volume and receding planes where horizon or vistas are represented. Also lighting on selected items may be necessary to emphasize their relative importance in the total scheme. In some exhibits, specific time of the day or night can be simulated by well-coordinated lighting arrangement. It is possible to have a flexible lighting system in such exhibits by means of which from day to night changing effects can be shown. This requires dimmer and lights at different points and of different colours. For example, in one very large sand dune diorama in the University Zoological Museum in Amsterdam, what is represented on the large foreground is seen as the site appears at dawn, morning, noon, evening, twilight, moon-light, etc. the effect obtained by changing the lights alone.

Some environmental exhibits may be constructed to look wholly or partly as peep-shows or cycloramas, georamas, cosmoramas, or similar spectacles, created for vicarious experiences. With the help of available modern technological gadgetry it is possible to employ appropriate animation techniques, sound effects and sound combined with lighting effects as well as changing image projection. Even smell and touch elements can serve as integral components of environment simulating exhibits, particularly in those into which the visitors are expected to enter and take a short walk. Introduction of live floristic and faunistic specimens and actual geological material available for touching can enliven environment simulating exhibits. It may, however, be noted that human models, in period costumes, used characteristically in open air museums of ethnology, should not become part of indoor environment simulating exhibits; because, in that case, exhibits cease to be exhibits and become demonstration-oriented situations.

One can conceive of a range of environment simulating exhibits with varying degree of realism for the purpose of controlling the extent of intensity of vicarious experiences. It will depend upon museum resources to make them feasible. The new public in India is getting so much exposed to the effects of vicarious media like films, theatre and television that static, conventional museum exhibits will have no dramatic impact on their imagination. Hence, ideally, where we intend to offer effective environmental education, at least some part of the museum should be devoted to environment simulating presentation. It is possible to make it either as a starting point or as a concluding part of presentation area, devoted to environmental education. Both alternatives have their advantages.

In contrast to the above type, the environment interpretive exhibits of the second sub-type are not, and need not be, so illusionistic and realistic. They are, like other interpretive museum exhibits, geared to the specific tasks of communication of ideas, information, concepts as represented, and illustrated, by original objects, specimens, replicas, models and audio-visual aids. Together, they have to show the museum materials holistically, synoptically, in integrated manner, and, negatively speaking, not in fragmentary, fractional, analytic manner. Hence, inspite of the functional differences between environment simulating exhibits and environment interpretive exhibits, their role is entirely different from non-environmental exhibits. It is for the individual museums to decide in what permutations and combinations these two sub-types should be planned to achieve the target of their environmental education programmes. But, looking to the importance of this genre of exhibits, its absence will certainly reduce the educational value of any museum, of any type, anywhere. It is submitted that if no seperate environmental gallery is organised, at least an "orientation section" to serve all other galleries should be organised in the form of presentation for environmental education with a judicious combination of the two sub-types of environmental simulating and environmental interpretive exhibits.

William Carey and Development of the Concept of Educational Museum in India

S. K. CHATTERJEE

The great philanthropic missionary and an inaugurator of national awakening in India, Rev. Dr. William Carey was born on 17th August, 1761 at Paulerspury in England. After receiving elementary education, he started to earn his livelihood by mending shoes. Later he was connected with religious work and by dint of perseverance founded the Baptist Missionary Society in 1792. As a representative of the Society he came to Bengal in 1793. In 1800 he established the Serampore Mission. He was appointed in 1801 as professor of Fort William College in Bengali, later in Sanskrit and in Marathi. The Brown University of America conferred up on him the Degree of Doctor of Divinity in 1806. He translated the Bible or part of it in 29 different Indian languages and with his help translation in 6 other languages were done. Besides this he was the author of Grammars in Bengali, Punjabi, Marathi, Sanskrit, Telugu, Kannada and Bhutani and dictionaries in Bengali, Sanskrit, Marathi and Bhutani. Two polyglot vocabularies one in 13 Indian languages and another in 4 languages, were also composed by him. His contributions in the fields of education, science, industry, agriculture, socio-economic development and socio-religious reforms are remarkable, his pioneering role in India's national awakening is no less so. He died at Serampore in 1834.

The conception of modern musuem and its essentiality in a civilised world was not very clear in India during the early years of 19th century. Still there were persons who were interested in collecting and preserving curious articles, but with little interest in displaying them. At that time Carey arrived in Bengal (1793). He was eager not only in collecting and preserving curious specimens but also in thinking about their use as tools of education. He realised that a museum should be an integral part of an educational institution and endeavoured also to work out this idea. Such interest for an educational museum was rare in India at that time.

Carey was a self-educated person and his interest in museum had not developed through any formal training but spontaneously from his boyhood. He derived inspiration from his father who used to tell him stories about the

British Museum. The passion of collecting and preserving curious materials was a peculiar hobby of young Carey who conceived the idea of having a little museum of his own. With school boy zeal he used to collect all kinds of insects, plants, birds' nests, anything and everything that could be regarded as specimens. The ardent young Naturalist was not content with dead insects only, but collected living ones also and preserved them in such a way that he might watch their development. With his sister Polly he used to search the countryside for miles around and seldom returned empty handed. Whenever he went out he was on the look out and carefully watched the hedges. When his quick eye detected any new specimen he examined that very carefully and collected that for his museum. His bedroom was thus turned into a miniature museum. W.H. Carey wrote, 'The room which was fully appropriate to his use was full of insects stuck in every corner, that he might observe the progress'. This hobby young Carey nourished was to develop later into a museum for spread of knowledge through education. He had no formal training to develop this idea nor any experience from any established museum.

Carey came to India as a missionary and spent the first six years struggling hard for existence. He had to move through the dreaded tiger-haunted swamps of Sundarbans. From there he came to Mudnabatty, a place in North Bengal and not very far off from Gour, where ruins of glorious past were abundant. In the midst of his work in the Indigo Factory, translating Bible and keeping school, he did not fail to closely observe the varieties of local plants and animals. His idea of developing a museum of Natural History was probably revitalised here. He planned to establish two colleges there and surely it can be guessed that his rich collection of natural history specimens were meant to be used for these Institutions. Unfortunately at the end of 18th century he had to leave Mudnabatty to join his newly arrived colleagues at Serampore, a Danish settlement near Calcutta.

On the 10th January, 1800 the Serampore Mission was organised by Carey, Marshman, Ward and other Baptist Missionaries. Printing schools, Botanical Garden, translation etc. started immediately. A library was established to accommodate not only printed materials but also others having educational value. Carey's Botanical Garden flourished soon and collection and preservation of valuable specimens became a part of his endeavours.

After 1813, when the ban on the Missionary societies was lifted, the Serampore Mission took the lead in introducing new education, vernacular journalism etc. The Serampore system of education was of signficance for, its aim was synthesis of western and oriental learning based on display and demonstrational method.

The missionaries prepared charts, globes, copy books, etc. as aids for teaching natural philosophy and natural history.

They had plans to organise museums for their schools. So the conception of museum as an integral part of education was clearly envisaged by these missionaries. But they could not fulfil their aim of establishing musums in their schools. They meant to educate the poor people living in the rural areas by giving them free education This drained their resources. In between 1816-18, they established 100 schools with more than 10,000 students and kept the cost at Rs. 3/- annually per student. As a result, they could not set up museums.

In 1818, the Serampore missionaries established Serampore College. Its prospectus and early reports had laid down in detail the plan of attaching Museum, library, laboratory, observatory with the college.

John Mack, the young scholar of Edinburgh University joined the College in 1821 and undertook the charge of Science department. Mack organised Museum along with Library and Laboratory. These were made integral part of the college and they played vital role in introducing modern science education in this country. Thus Carey introduced the conception of educational Museum in modern India.

The conception of modern museum was developed by a handful of British Orientalists in India during the closing years of 18th century. The first of its kind, Asiatic Society was established in 1784. After that in 1787 Sibpore Botanical Gardens with Horticultural Museum was founded. Carey was intimately connected with these two pioneering museums where his interests for museums were to some extent utilised for their development. But these museums were mainly connected with scholastic researches and had nothing to do to promote general education of the country. But when the Fort William College was established in 1801, cultural relics of the past, printed manuscripts, etc. were collected and preserved in its Museum. Carey, then a professor of the College, had played an important part for its organisation. The so-called museum of Fort William College may be regarded as the first educational museum of the country. In 1814 Indian Museum, the largest of its kind in India, was established. Carey had no direct connection with this museum, probably by that time he had shifted his interest in organising his own Institutional museum.

Carey was able to establish a museum of all India character when he founded Agrihorticulture Society of India in 1820. This society with its green house is existing as an important centre of Agrihorticulture through which Carey's name is still perpetuated in the history of Indian Museums. From the various letters of Carey to his friends and relations it can be understood that he continued to maintain a private museum of his own and was able to make a rich collection of the specimens of natural history specially shells, corals, fossils, minerals etc. His interest was mainly concentrated to zoological, geological, botanical, and agricultural specimens and his personal museum was rich in those collections. These specimens were used in course of his lecture on Botany and agriculture in the Serampore College. He wanted to make his teaching interesting and useful with the help of his collected specimens. He realised that through display eagerness of the common people can be drawn to the developent of modern science. He also tried to train the native people in observation, collection and preservation of the interesting objects of Nature. With this Carey also wanted to infuse in them regard and reverence for the articles of antiquity. He realised that the people would lose regard and interest of the past of India if only western education, discarding oriental culture, is imparted to them. Before he died he presented his personal Museum to the college. His will states:—

"...........Thirdly, I give and bequeath to the College of Serampore, the whole of my Museum consisting of minerals, shells, insects and other natural curiosities and a Hortus Siccas. Also the Folio edition of Hortus Wobarnesis, which was presented to me by Lord Hastings..........." the last named article (which is still preserved) is a very peculiar book on grass where original specimens have been pasted on the pages along with their descriptions.

Carey breathed his last on the 9th June, 1834. With his demise dark days of Serampore Mission started and Serampore College Museum struggled hard for existence for a long time. Reorganisation of his Museum could not be possible during that dark period of the college. Large number of valuable specimens have been lost during this long period of negligence.

Only recently at the time of Bi-centenary celebration of his birth anniversary in 1961, Carey Museum has been organised along with Carey Library, as a repository of the memorabilia of Carey and his worthy associates.

Archaeological Collection for Tomorrow

C.T.M. Kotraiah

Introduction:

Our country being a vast one with a great record of history has inherited rich archaeological wealth in all its variety and abundance, which can go to enrich the collections of hundreds and thousands of museums all over the country; some already set up while some others are still to be set up. It can also subscribe to augument the collections of museums of other nations too, as it has already done in the past to a considerable degree though under different circumstances, as testified in the collections of many museums of the western countries and some of its affluent individuals. Inspite of much clandestine migration in the past our cultural property is still so rich both in quality and quantity and so extensively scattered throughout our country and in such abundance, it can be said that we in India are still to go a long way in the matter of its collection, in a methodical way and preserving it for posterity. This has not been done even though the country is very much concerned with museum activities, in the modern sense, ever since the first museum—known today as the Indian Museum, Calcutta—was started in the year 1814 at Calcutta by the Asiatic Society of Bengal. It is to be done in a planned, programmed and purpose-oriented manner, though considerable efforts have been made during the past one century and a half by various agencies, institutions and individuals. As a cumulative effect of all these efforts, India has today nearly 200 museums—some big, some medium, some small—all scattered throughout the country. These are devoted wholly or partly for archaeological material. While many of them are managed by government departments, others are managed by private organisations or individuals.

The Archaeological Survey of India itself is actively involved in this effort and it has as many as 30 Archaeological site-cum-period museums, each a specialised one in its own way. Many more are on its list of proposed museums.

Besides, both central and state governments are also encouraging private organisations and even individuals, with financial aid, technical know-how, equipment, advice, etc. in setting up new museums or developing the existing ones. All these activities are directed and aimed at the primary and common objective of collecting archaeological material and saving it for posterity. These efforts though commendable are not commensurate with the task before us; this is particularly so because of the richness, abundance, diversity of the materials which are found all over the country; being located in remote places or in the middle of thick jungles sometimes these are not easily accessible; and this archaeological wealth of India needs to be collected in its entirety by various institutions, organisations and individuals participating in a coordinated programme.

In this short paper importance of pursuing this 'Collection for tomorrow', the challenges that are confronting it and measures to overcome these are discussed in brief, with special reference to archaeological material, in India.

Importance

As already indicated above, the archaeological heritage in India is so rich and so abundant that to collect and preserve it for tomorrow the existing two hundred or so museums, mentioned above, are far from sufficient. To achieve this, it demands a planned and concerted effort not only on the part of governments and its subordinate organisations but also from private organisations and citizens and of all strata of the society. In short, and under the present circumstances, community involvement is the primary need in order to do justice to the job of collecting for tomorrow. In India almost every village, town, city, site or mound has something to tell about its past history and offer specimens of its cultural achievements. We see monuments, sites etc. right from the prehistoric times, the days of Indus Civilization, the Epic period, the historic periods including modern period etc. all abundant in archaeological material. To collect and house this material museums in eachd istrict, taluk, town, educational institutes besides the government organised ones have to be set up. If this is not done now, some of them are likely to disappear not only from their original places, but also from the country and they will have to be considered as permanently lost. They cannot be replaced or revived; this is peculiar to archaeological material. Hence saving it for tomorrow is all the more important and this responsibility has got to be discharged by the present society with all sincerity, application and in a duty-bound programme.

And it should be done in its entirety, or at least as near as possible. What has been done in most of the cases in the past can be said to be only partial collection or haphazard random collection. This will not be able to offer a complete or near complete picture of the subject intended to be presented, and in wider perspective, of the total cultural heritage. Those in charge of collection should bear this in mind and endeavour for achieving that completeness in collection and presentation. This task demands constant thinking, alert and vigilent mind and above all devoted effort—any slackness means the loosing of entirety not only for the man of today but also for the man of tomorrow. So in the first instance there is need to arrange for collecting the archaeological objects proclaiming the cultural achievements of all periods, of all places and of all degrees of importance for the sake of tomorrow. This in its natural course leads to the setting up of more museums or expanding the existing ones and providing of adequate accommodation, devoted staff, finance and so on.

Again, this collection for tomorrow should be done keeping in view the important role it has in educational activities not only in our country but also of others, particularly of tomorrow. Of late we have entered the 'Space-Age', we see tremendous advancement in science and technology. Now we realise the importance of visual education which with its three-dimensional picture, is much more effective and capable of leaving a lasting impression. It is needless to state here that our museum collection plays exactly this role in imparting knowledge to the public This aspect, inherent in the collection of any museum, is destined to play an important and increasing role in the field of educational activities of man, more so in the future to come.

Another important aspect inherent in the collection of archaeological museums is its specialisation. Knowledge, in traditional systems as well as in new ones, is increasing in such dimensions that specialisation has become an unavoidable necessity. On the same lines, our archaeological museums are to be considered as specialised ones. Their purpose and scope are different from the general museums. This can be discerned in their collection itself. In this respect, they are important and unique since their collection is meant to present history and cultural attainments of a particular site or site-cum-period (sometimes several periods or phases of cultural developments at that particular site). These museums through their collection present to the public, the human activity of that site during a specified period or periods. Their attempt is to provide a complete but a specialised picture. Even if one aspect of human activity of the site is not presented, the picture becomes incomplete. Whereas the general or art museums normally situated in metropolitan cities present representative objects of different sites, periods and sometimes of other nations too—all this from aesthetic and representative point of view or rarity of the object and so on. Hence the task of collecting for an archaeological museum in not only a difficult but a continuous one and demands on the part of the museum staff constant vigil, planning and effort. This is again with the sole object of presenting, for tomorrow, a complete picture of the past of the site concerned. Any negligence on the part of those in charge of archaeological museums will lead to the disappearance of some objects, quite often important ones too, and thereby deprive the man of tomorrow with some of them out of this specialised collection. This specialisation of collection in archaeological museum is in accordance with the forthcoming more and more specialised activities of the man of tomorrow.

The next important aspect of our 'Collection for tomorrow' is the role of the museum in the future as an entertainer. In these days of scientific and technological advancement, man has invented and adopted so many devices and machanical contrivances resulting in much leisure time. This leisure time makes him think of ways of entertainment, recreation, sometimes combined with learning. Particularly, with the invention of electronic and computerised gadgets, tomorrow is likely to have more leisure for man. One of the answers for utilising this can be found in museums. Going round in a museum will be entertainment-cum-learning for the man of tomorrow. Here, he will not only be able to get rid of the drudgery of his routine and mechanical daily life but also find means for recreation, pleasure and entertainment in the collection of the museum—of course, its effectiveness varies in degrees and from person to person depending on the individual's aptitude, mental receptiveness, educational background and so on. Since tomorrow is bound to be more sophisticated—more mechanised due to advancement in science, technology and engineering—museums and their collections are all the more necessary and bound to play important roles. Particularly if the museum is situated a bit away from the busy city, amidst calm and serene setting, it is bound to become very important for the man of tomorrow and its collection will be the primary character in this play. Our collection in archaeological museums fits in here quite justly and purposefully. As we can observe these days, museum-consciousness in man is growing fast and very fast indeed. No doubt it is a healthy sign. Accordingly the collection of a museum should be such and set in such a way as to play this part of an entertainer for those who come seeking it.

It is needless to repeat that the past is the basis of the future of mankind. Even archaeological collections have got to say much in this direction. Hence the museum collection should attempt to possess this 'past' as complete as possible and preserve it in the museum for the use of tomorrow. The study of this 'past' becomes the basis or guide-line for the future evolution, progress, development and ultimate achievements, of course with due adjustments as dictated by the contemporary needs, circumstances and so on. Thus the archaeological collection of a museum has got an important bearing on the developmental activities and achievements of the man of tomorrow.

One of the natural and in-born instincts of man is to possess something unique, rare, special, peculiar, fantastic or distinctive and take pleasure in it and also find joyous contentment when shown to others. It is all the more great when it belongs to his ancestors or the past. The very fact that older the object, greater the price and admiration it commands is something which tells about the archaeological collection in our museums. Similarly, satisfying the above instincts of man of tomorrow depends on the collections we make for archaeological museums. The systematic collection of archaeological objects in our museum is bound to become the pride-possession of tomorrow's man and his country. It is for this reason that rich nations and individuals are always trying to own something considered important or special by resorting to, not necessarily always, fair means. Probably on account of this an adage has taken shape and circulation which goes to say that in ones effort of enriching the archaeological collection, be it of an individual or of an institution, one can resort to any of the methods like 'beg, borrow or steal'—that is, even stealing has not been forbidden when the question of collecting is involved. Thus collection of a museum, particularly of an archaeological museum is to be built up not only with a view to possess something unique, special but also to make the story of that institute complete, and this will be for ever, as museums are permanent institutions set up to present knowledge through its collection. Hence collection for tomorrow, particularly in the case of archaeological objects, is the greatest responsibility of the museum-in-charge.

Problems and Remedies:

Now let us see some of the factors that are detrimental to the archaeological wealth of the country on account of which there is urgent need for a concerted effort to take up collection for tomorrow. The first in this list is the problem arising out of the enormous growth of population. Corollary effect is increased activities in the direction of construction of buildings, expansion of cities and towns, increased agricultural operations, attempts to bring more and more land under intensive cultivation, construction of dams and irrigation canals, growth and development of industries, spread and operation of transport system and so on. All these cumulatively affect the archaeological wealth very much.

Next danger is from the smugglers, thieves and vandals. The human instinct to posses and take pride in such possessions has been inducing rich individuals and rich nations to indulge in or encourage such activities. This has resulted in faking, theiving the originals and quite often smuggling outside the country. Thus the place of origin is deprived of them which leads to a void or gap while presenting the collection to the public. In the past also when the country was under colonial rule, hundreds of objects definitely the best ones, were taken away under some pretext or other thus depriving the original place of its collection.

These activitics are to be checked by all those concerned, adopting appropriate measures unitedly. It is heartening to note that the UNESCO is promoting the return of cultural property to the countries of origin. This should be pursued vigorously. Future, legislation should come forth to declare that all archaeological property belongs to its place of origin only and whatever is found elsewhere should be returned to its original place as a matter of right, irrespective of means and time adopted in possessing them. Such a legislation will not only do justice to the place of origin and country but also to the collection of mankind as a whole. At the same time and with a view not to disappoint the present owners, replicas or casts, preferably made in fibre glass may be prepared and supplied—as replicas in fibre glass look like the originals except in the material used. Wherever necessary preparation of models, transparencies, photo enlargements etc. may be resorted to. Such an action may ultimately put an end to faking, stealing and smuggling.

Further, as exporting of archaeological objects has been banned, importing also should be banned by all nations. This step also will go a long way in putting an end to smuggling activities by individuals, once for all. Inspite of that if anything happens, the original place or institution should get it back as a matter of right and justice as in the case of extradition of criminals between nations. These steps are to be considered by all nations under the guidance of UNESCO/ICOM.

Further, even exporting of art objects and handicrafts of modern days should be by one agency only and it should be a government one, and a centralised one too. For, in the name of modern handicrafts, many genuine things also go outside the country with the machinations of the smugglers. Nationalisation of this trade may also go a long way in checking clandestine export of archaeological objects.

Another hazard faced by the archaeological wealth is from the excavators, not necessarily always but quite frequently, particularly when the excavator happens to be a foreigner or foreign organisation. In such cases, the excavated material is taken away from the site of its origin in the name of writing the report. It so happens that quite often the report is not completed for years, sometimes for decades. Under such circumstances, some objects are likely to be misplaced, lost or damaged in course of time. This is not at all desirable from the collection point of view. Therefore, to put an end to such happenings, a policy is to be formulated by all nations, including India, that whenever a major excavation is approved and sactioned, simultaneously a museum at the same site should be sanctioned, staff posted to take care of the excavated material deposited with them. In the name of writing the report, the excavators should not be allowed to take the material away from the site. This means the collection is always available at the site of its origin. These steps are also necessary in the interest of 'Collection' for today as well as for tomorrow.

Epilogue

Thus archaeological collection for tomorrow, should be given full and due attention, by governments, public institutions and individuals. Again there should never be any kind of complacency in this. The collection should be constantly growing with the sacred aim of building and projecting a complete picture of human activity of the place or site concerned. For this purpose, the staff to be placed in charge of this 'Collection' should always be not only devoted but also vigilant, alert and active; above all have patriotic approach thereby discharge that great obligation for tomorrow.*

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*The views expressed and the arguments put forth in the above paper are purely personal and they in no way either endorse or review the policies and directives of the Archaeological Survey of India, Government of India, in the service of which the author is employed.

Teaching Potential in a University Museum

ATUL CHANDRA BHOWMICK

A university museum is an educational institution located within a university campus, and is administered by the university authorities. It lays emphasis on study and research of the students and teachers. A university museum is essentially a teaching institution, and its collections are the tools for teaching.

In earlier days a museum was considered as repository of curiosities meant for enjoyment. This was the 'store-house' phase. This concept had, however, changed, and nowadays, even a public museum is considered as an aid to teaching and education. The importance of a university museum in the field of teaching is of recent realisation, and for that matter university museums have been coming up almost everywhere. Though late in origin, the achievements of university museums have been held as quite important in the field of teaching.

University museums are directly associated with teaching departments for carrying study and research programmes which are closely integrated with the college and university curricula. Often staff members are found engaged in teaching. The emphasis in the university museums is no longer placed merely on collections and preservation; teaching, scientific research and interpretation through the assembled cultural heritage have come to be recognised as equally important functions.

Today there are many university museums at home and abroad. Much headway has been made in America and Europe in the field of university museums particularly in the area of fundamental research and teaching. To name a few important ones are the Harvard University Museum, Yale University Museum, Colorado University Museum, Museum of the University of California, Neberaska University Museum, Arizona State University Museum—all in the United States of America; Royal Ontario Museum of Toronto University and Art and Crafts Museum of the University of Wales, Bristol University Museum, Cambridge University Museum, Pitt Rivers Museum of the University of Oxford and such others. In India, the Asutosh Museum of Indian Art of the University of Calcutta, the first university museum in India (1937) started an intense short course in art appreciation (Teachers' Training) for three months in summer as early as 1941, and the course has created a spirit of emulation in teaching in India. Bearing in mind the teaching value of the university museum similar museums are springing up in other universities. Mention may in this connection be made of the Kausambhi Museum, Allahabad University; Bharat Kala Bhavan, Banaras Hindu University; Central Museum, Pilani; Commercial Museum, Gauhati University; and the like which have been established under different universities with diverse collection of great teaching and educational value.

In India, however, even today, university museums are considered merely as centres of cultural heritage, and they supplement college and university teaching. Sir Asutosh Mookerjee expressed in unequivocal terms the educational potentialities of a museum in his inaugural presidential address of the centenary of the Indian Museum, Calcutta in 1913 that "............ the Museum may be regarded, first, as an adjunct to the class room and the lecture room; secondly, as a bureau of information; and thirdly, as an institution for the culture of the people" (Mookerjee: no date : 18). This conception has been responsible for the development of museums as centres of teaching and development. Ruthvin (1931) had for the first time expressed the idea of planned organisation of a university museum. Following Ruthvin Prof. D.P. Ghosh (1937), Wittlin (1940) and Coleman (1942) considered university museums as specialised institutions for teaching as well as for advanced learning and higher research. C. Sivaramamurti, Prof. Kalyan K. Ganguli, S.K. Srinivasan, etc. along with Prof. Ghosh have come to think of university museums as teaching institutions which can embrace the functions of imparting formal and informal education through the documented reference collections and systematic arrangement of exhibits in galleries.

In India university museums are usually of two types : (a) central, and (b) departmental. Central museum generally houses objects of art and archaeology, sculpture, painting, terracotta, pottery, textile, folk art, etc. Departmental museums are found to preserve objects pertaining to the concerned subjects, such as anthropology, botany, zoology, geography, technology, physics, etc. These are usually found attached to respective decentralised departments of science faculty. Decentralised science museums are held in a growing favour in universities of India as well as abroad. The collections in these museums are set up as auxiliaries to class room and laboratory teachings of different departments. Departmental museums are developed as units occupying rooms for significant collections relating the subjects. It may be said that the central museums developed by universities tend to become free establishments with objectives and works of their own; whereas the departmental museums are quite certain to develop along the lines of direct academic requirements of teaching and research of the department. University museums either central or departmental stand always to uphold their educative role.

When a university takes up any subject in the field of higher education, museum materials in those fields become the grounds on which a large quantum of teaching and research can be based. In 1965 the Inner London Education Authority listed 634 different types of classes arranged all over the world in fostering education and the museum education had been listed as one among those (Harrison : 1967 : 6). Museum collections have functions as important as the functions of books, charts, models and other teaching aids. In the field of teaching and education university museums would probably be taken as much for granted as other educational aids. Consequently universities without exception should take museums into reckoning for academic functioning. A university museum should be an instrument of teaching or research, or of both like the character of a university. The task of imparting teaching and education should be shared in joint co-operation by university and museum.

Every university should have a central as well as departmental museums within their confines. The first duty of a university museum is to cater education by way of teaching among the students in particular, and to the public at large. This idea is found expressed by Hugo G. Rodeck when he says, "I most certainly do believe that it should look to adult and fundamental education as well as faculty and students interests. The University Museum offers a unique contact of the University with the general public which I believe, should be exploited,' (The Calcutta Review : 1971 : 185). Public service is a specific activity of a university museum, and this has to be done through display, lecture and exhibition. The Asutosh Museum of Indian Art of the University of Calcutta extends its work through exhibits and lectures to the general public of the city and its environment.

The collections of a university museum exist as aid to teaching and to higher education. Even though the exhibits that are related to teaching and research are held as accessible to the public, and their reference collections and files of photographs may be made available to outsiders, and the lectures and exhibitions are thrown open to public, yet university museums should not be run as public museums. The functions of public—, state—, and university museums may be closely interoven for catering education, yet the functions of a university museum should be held particularly dedicated to the cause of teaching and research. In public museums educational activities are carried out not to the same extent as is done in a university museum. All excursive efforts of a university museum should be secondary to the main job. The main is to foster research and education as parts of the regular work of university teaching for the benefit and edification of students. Such museums should not try to attract everybody in the name of either education or recreation. As the university museum devotes to teaching and education, there is a clear need for a coherent and balanced collection. Their systematic and coherent displays in galleries go a long way to help a teacher successfully to conduct classes with visual aids, and for that act university museums would do well to ask themselves just what is meant by a 'teaching museum' or 'visual university'. Without them the educational fabric would remain incomplete. To the students the museum exhibits are intended to present the outward and visible explanation of what they have been taught in books, while to the general public they offer education and instruction. Mrs. H.R. Downie of the Royal Ontario Museum of Toronto University wrote in 1966, "The Royal Ontario Museum, Canada's largest, embraces the records of man and nature alike in its 90 galleries it has research as a primary function........... More than 5,00,000 persons draw on its resources every year, which include university students, scholars, school children, collectors and casual visitors" (The Calcutta Review : 1971 : 1985).

The concept of university museum as a center of teaching has been the cause of its coming into existence. This concept also determins the direction of its growth. In the beginning, such a museum may often be considered a showplace or the symbol of culture in the campus. Universities select diverse subjects for study, and the knowledge gained thereby develops among learners skill through experience. But skill without knowledge remains without substance. When university departments provide subjects for study, university museums expertise students to gain skill through visual training. The importance of a university museum rests in meeting needs of teaching, and today it is well acknowledged by the students. Charles Parkhurst says that "all museums should be university museums" (The Calcutta Review : 1971 : 17). Of course untill recent times this has been an over enthusiastic optimum. He emphasised the teaching as well as educational role played by museum. University museums should be fully aware of their teaching and educational functions in planning their programmes. Progress of university museums should rest on the cooperative sharing of teaching responsibilities between the university museum and the faculty departments of the university. The teaching potentialities of a university museum as a means of communication is achieved by engrossing the students in studying museum collection. A bad collection is worse than no collection for to educate students badly is more worse than not to educate them at all. To achieve the educational merit collections should be selective, and arrangement requires clear understanding on the subject. This is tedious indeed. The arrangement entails the following educative qualities, and in quoting Alma S. Wittlin *in extense* these are mentioned:

(a) "The visual method of exhibition conveys to the majority of adults and of children a greater number of facts in less time than if these were expressed by words, written or spoken. The visual and textile qualities of specimens, their "reality", make an emotional appeal to people which seems to increase their sensitivity and capacity to assimilate information of considerable complexity and subtlety".

(b) The visual method of exhibition is suitable for presenting a number of facts simultaneously, in a synthesis, and thus (a) each single fact in proper proportion and perspective, (b) with stress laid as much on the relation between facts as on each of them."

(c) "In addition to imparting facts to people the museum offers opportunities to challenge them to active co-operation in the process of learning and to stimulate in them certain attitudes, such as the faculty of observation, logical thinking, responsibility and imagination. In this way the museum may, better than other media of study, offer to people experiences which in the past were acquired by growing generation through observation of events in their environment. A carefully selected set of specimens in a museum may act as a semblance of an environment, to be viewed or to be used as a scene for activities" (Wittlin : 1949 : 188-189).

A university museum should conduct expeditions for augmenting its collections. Exploration and excavation not only enhance the museum collections and the status of staff members, but offer rare opportunities for the university students to participate in the field—works in order to gain practical experience. Thus the students become expert in their fields of interest. Many expeditions in different areas may cover specimens over a wide range of subjects. Display of specimens should be in a manner that may enable students to see each object singly and closely, and to handle them under favourable conditions of space and lighting. Specimens act as 'feelies' and the feel, thus experienced through handlings, fills hiatus of the learning to make it whole as far as possible. For, 'seeing is believing', but most people tend to forget that touching and feeling may be even more than that. An approach to this end will be to present specimens, be they natural history, art-archaeology, anthropology, geography, geology, etc. in the order either of chronology, geography or typology as per requirements of the concerning subject. The best solution would be to offer both geographical and typological arrangements having their bases in chronological order. Pala and Sena sculptures or palaeolithic tools, as example, would be displayed in the context of culture, and or of different areas and ages. A museum can rarely possess all representative collections, and their varients. It would therefore seem imperative to supplement the available specimens with photographs, sketches, models, etc.; so that the resulting displays should be balanced and meaningful to their nearest approximation. Such a presentation will definitely enable the students to visualise facts and events, and help students get relieved from cramming of texts. This system of visual education is considered to have a more lasting effect than a written description. So, we may conclude that university museums are concerned with teaching and education through various means Its exhibits can be made use of as an extension of the class room lesson, presenting factual information in vivid and pleasing form, and have the most effective mode of communication that exists. University museums do not merely state facts; they can show the relationship between things which may not always be brought clearly into focus by text books or verbal lessons. They can then stimulate thought and encourage clear observation and logical deduction Teaching with the help of museum objects requires selected materials arranged in didactic and synoptic ways. Higher education and research call for copious study collections, including both worked and unworked materials, with adequate data. So, research collections characterise the university museum.

India first felt the need to open museology department to foster Post-graduate studies in museology and museography for the museum personnel, and there are altogether six universities in India which possess museology departments. The Maharaja Sayaji University of Baroda first started a two years Post-graduate Diploma course in Museology in the year 1957, and subsequently the University of Calcutta in 1959, the Banaras Hindu University in 1968, the Birla Institute of Technology and Science, Pilani in 1972 and one year diploma course in Museology by the Bhopal University in 1974 and the Aligarh Muslim University. The Post-graduate Diploma course in Museology of the first four universities had concerted into the Degree course in Museology. It is worth to note here that the museology departments started catering to university museums. These university museums render every help and assistance for the growth of the museology departments and teach the students with the help of museum specimens. Students take training in preservation and conservation in museum laboratories. Thus we see that university museums have teaching potentiality.

There is a widespread belief that we learn by being taught. The earliest kind of learning is by example, for, example is always more efficacious than precept. University museums as well as the public museums are homes studded with examples which can be utilised for illustrating class room lectures. Stating the teaching and educational value of a museum David Murray (1904) in his book, 'Museums, their History and their Use' writes, "with us, museums are regarded too much as mere exhibitions, and are too little employed for practical teaching. The museum ought to be an adjunct of the school .... the sight of even a poorly set-up whole in accurate drawing to scale" (Harrison : 1967 : 25).

The success of university museum in the field teaching and of disseminating education depends not only on its number of collection; it as well depends on qualified staff. The curatorship is given to some one who as well holds a high place in the teaching faculty. Similarly assistant curators may hold double appointments, so that the teaching and museum staff are interlocked for the furtherance of education. Staff requirements, under the curator/director depend upon the nature and variety of programmes. If only a teaching collection is desired, the curator needs help for care and physical handling of objects, for installing exhibits in galleries, and for collection. But if the activity of study as well as research is likely to be carried out there is need for research curators.

A university museum fosters teaching and educational activity through exhibitions, permanent and temporary demonstration and lecture programmes. Exhibitions are more vivid and hence, they are a good supplement to the reading of books. Again the viewing of an exhibition is less tiring and more living than a book. The museum staff would be able to put up exhibitions in galleries, libraries, union buildings, and other places where student can go in free time. The teaching curriculum and the exhibitions are frequently tied together for imparting education to the onlookers. Thus, the university museum is essentially a teaching instrument associated with the departments like arts, science or history, and thus the academic community awares of the collections in the museum. Temporary exhibitions point to a particular subject. Such exhibitions can supplement the permanent display, and can be a useful focal point for arranging lectures, discussions, film shows, and other educations activities. However, temporary they may be, care must be taken to display exhibits thematically, and to provide sufficient background information. If such an exhibition of objects from different countries is arranged, a map of the world is an essential adjunct; if the objects are taken from different cultures and different periods, some arrangements for showing their relative position should also be made for a clear understanding of the theme. If the exhibits are of varying materials the visitors will be interested to know about the sources of the materials. Display either temporary or permanent, can provide enjoyment through which teaching and education can be imparted to visitors. Exhibitions in university museums really make one more curious, and one desires to increase one's knowledge about particular exhibit, especially if the subject appeals to one. For furthering the cause pointed out in prelines, experts may be called upon to deliver talks. The purpose of these lectures should be to stimulate interest in the manifold treasures displayed in the museum, to publicise the education and visual teaching of the university museums and to inclucate and to develop a spirit of museum consciousness among the public in general, and the student in particular. Whether the speakers are from the museum staff or from elsewhere, whether the lectures are given in the galleries or in a separate lecture hall, it is essential that the speakers should be well conversant with the topic, and be able to meet the audience of varied levels with facts and ready explanation when asked for. Such type of teaching activities of a university museum are very helpful to learn things in around and aim to give people a contacts with heritage and culture at cross-roads.

Publication is another important factor in fostering museum education and teaching. Most university museums issue publication in numbers in the form of attractive illustrated guide books, picture postcards, monographs, catalogues, etc. Reproductions of photographs of original objects are essential to serve the mission of teaching, and have a role of their own as visual records. Class lectures illustrated with these museum publications and photographs have a lasting impression on the students mind. It is, indeed, true that one original is better than many reproductions. Photographs often make up the defeciency of reproductions, and prints in black and white and in colour are considered indispensable for research and study purposes. Prints, models, charts, diagrams, and photographs can not replace the value of originals of exhibitionable objects. However, these can have some educational and teaching value if properly used, and can add enormously to the liveliness of the galleries and their understanding. In fact the reproductions may well be of less significance if one has seen the originals. In museum display originals are held as bearing the full value; reproductions carry only half the merit.

University museums may have in their collection different types of objects made of different materials, by different processes, by different people, of different areas, for different purposes. All things have to be considered of great value, because those had been made, used and had served basic human needs. All these have much to teach us about their quality, design, and suitability. The collections of a university museum may well be held as a shrine where the cultural activities of men, scientific developments, art, archaeology, biology, etc. find mirrored in a great measure. Thus university museums which grow up as abodes of objects of diverse categories, nature and disciplines, are obviously capable of stimulating a spirit of enquiry and interpretation among the students and scholars. These can make the path smooth for advancement of learning while still remaining intensely attractive to onlookers seeking a panorama of display. In fact, the repertoires of objects in a university museum, whether they are being highlited in display or they relegate to the obscurity of the reserve collection they add great value as useful tools to the aid of teaching and education. In this perspective the university museum has a very important potentiality in the field of teaching.

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University Museum and Community

(With special reference to Bharat Kala Bhavan)

O.P. TANDON

The main theme, of the 16th Museum Camp held at Bharat Kala Bhavan (B.H.U., Varanasi) in 1983, was 'Museum and Community'.

The topic assigned to the author was related to the University Museums, obviously due to his association with Bharat Kala Bhavan, a University Museum in the truest sense of the term. It may, therefore, be relevant to mention a few words about the birth, growth and development of this now internationally renowned institution and its present infrastructure and functional dimensions.

Background Story

All great institutions owe their genesis to great minds. Bharat Kala Bhavan is no exception. Its debts to its progenitors, Rabindranath Tagore and Rai Krishnadasa Jee cannot be adequately expressed in words. The Bharat Kala Bhavan was set up in 1920 and christened then as Bharat Kala Parishad. where unique treasures of Indian Art representing centuries of cultural ethos and traditions could be preserved for posterity. This idea was concretised barely four years later when the nucleus for one of the greatest seats of learning, the 'Sarva Vidya Ki Rajdhani' was laid down in 1916 by Mahamana Pandit Madan Mohan Malaviya, on the banks of holy Ganga in the 'City of Lights'. How do we explain the merger of Bharat Kala Bhavan with the Banaras Hindu University ? Was it incidental or was it destined. The founders of both the institutions spent their early years in Allahabad but chose Banaras as the site for their bequests.

Kala Bhavan was brought into the folds of the University in 1950. By then, the collection built by Rai Krishnadas had assumed great importance amongst the world of scholars.

Bharat Kala Bhavan represents and stands as a true symbol of the many faceted genius that Rai Krishnadas was.

Thus, in 1950, foundations of a true University Museum or rather a

'National University Museum' was laid in the University. It coincided with the establishment of a College of Indology and a College of Music and Fine Arts. Thirty-three years hence, we are to examine and judge the extent of success and failure of its claim as a University Museum and the services that it has rendered during this period and the plans that it has, to make itself more purposeful and relevant to the need of proper social and cultural motivation.

Its Character and Dimensions

There are 120 Universities in India but there are hardly six full-fledged museums which exist as part and parcel of the university system. These are Asutosh Museum of the Calcutta University, Bharat Kala Bhavan of the Banaras Hindu University the Archaeological Museums of the P.G. Deccan College Poona and the University of Allahabad, Rabindra Bharati University Museum, Calcutta and the Museum attached with the Punjab University, Chandigarh. In addition to these there are departmental museums which function more as teaching aids. They are neither equipped to function as museums nor are they adequate and representative in contents. The six University museums mentioned above, are specialising in one or the other aspects of art. Amongst these, Bharat Kala Bhavan alone presents a fairly representative character in its content. It has a rich and sizable collection of paintings, sculptures, bronzes, terracottas, coins, textiles, manuscripts, metal and glassware decorative arts, such as jade, jewellery and ivory, tankhas, firmans and arms and armours etc. Its total holdings are about one lakh now. It has a fairly large building of its own. It has a well-equipped photographic section and a small Conservation Laboratory which is alive to the problems of preservation and is trying to handle its job with skill and care under close and watchful eyes of National Research Laboratory for conservation of Cultural Property. It has lately developed a good library which is growing fast. The Museum's educational programmes include mounting of temporary exhibitions mainly thematic in character; organisation of seminars and extension lectures and an intensive publication programme. It has successfully commenced its photo-documentation work and has already covered the entire paintings collection.

Academic Aspects

A post-graduate diploma course in Museology was started since 1968 under the aegis of Bharat Kala Bhavan to train museum personnel. Following the recommendations of a U.G.C. Workshop on the subject, this course was remodelled and restructured into a two Year's M.A. Course since 1979. We have deliberately kept the intake very restricted so that the job opportunities are not outrun by sheer numbers. Our training and instructional potentialities have been recognised further by the U.G.C. as it has sanctioned two Senior Research Fellowships and one Junior Research Fellowship to us for providing intensive in-service training to young and promising students. These are not tagged with formal Ph.D. programmes and are thus not tied to a mere routine academic exercise being conducted almost in all the teaching departments in the University. The above is a brief outline of its physical dimensions and work horizons.

University Museum

Let us now examine as to what constitutes a 'University Museum'. There appear to be three broad elements: (i) legal status, (ii) type of collections—whether represented in the University's prospectus of studies and research activities, and (iii) service to the members of the University community in particular. The proceedings of the Fifth UNESCO Regional Seminar on "The Museum as a Cultural Centre in the Development of the Community" mentions that a University Museum in extending its services should aim to:—

(a) promote cultural diffusion, integration and culture change;
(b) promote the exchange of scientific knowledge;
(c) promote inter-disciplinary collaboration and interrelate the various departmental specialities of the University;
(d) promote and explain scientific research, particularly that which is being carried on at the University;
(e) counteract the 'bookish' atmosphere by becoming a 'show place' of the University.

Role of Bharat Kala Bhavan

As far as Bharat Kala Bhavan is concerned, it practically fulfils the above requirements and its activities are oriented to a great measure to the aims mentioned in the preceding paragraph. It is a constituent part of the University although it maintains its separate entity and its autonomy is recognised to a fair degree. The studies in Indian Art and Archaeology, Fine Arts, Sociology, Literature, Chemistry, Geology and Applied Sciences such as Metallurgy etc. in this University provide a very useful knitwear of education. This Museum aims at collection, preservation and promotion of cultural heritage and in the process, disseminates knowledge at various levels. It also presents a forum for interdisciplinary studeis. Every exhibit on display and every object's maintenance poses a question and raises a problem. The pair of eyes witnessing the object and the mind communicating with it reacts and counteracts in more than one way and thus the process of education turns into a continuing cycle. There is always an ideal to achieve, there is a stage of perfection to be attained but if measured modestly, Kala Bhavan appears to pass the test of a University Museum at least in the Indian context.

Museum and Community

Museums all over the world are now recognised as powerful instruments of popular education. No emphasis is now required to strike this point. Both the territorial and the type classification indicate it. There are the national museum, state or provincial museums and the municipal or local museums. Then there are Ethnological Museums, Natural History Museums, Science and Industrial Museums, History Museums, and Art and Archaeology Museums. For this, there are University Museums, School or classroom museums or children's museums, Pedagogical museums and other specialised museums. Above all is the growing concept of developing museums as living centres of community. All these prove beyond doubt the multi-faceted role that the Museums play in educating the community.

Museum Vis-a-vis University

A large museum is comparable in many ways to a University. As the Universities have departments of various academic disciplines, such as—Anthropology, Art, Zoology, Botany, Geology, History and Education etc., specialised Museums also have separate sections devoted to natural sciences, physical sciences, history art and archaeology etc. Like the University, the Museum is dedicated to education. But while the Univerisity teaches and communicates with a homogenous group of students of approximately the same age group and level of education seated as a captive audience behind closed doors, the Museum Curator communicates to quite a different audience, a real heterogeneous group of people and here lies his versatility and competence and involvement. The museum community consists of individuals of all ages, interests, education, levels and walks of life. is undoubtedly a great difference between the University and the Museum. The means of communication differ entirely. While the University don expresses himself primarily through verbal means, the Museum Curator employs visual means. But it is necessary for the Museum Curator to give forethought to his exhibits and design his explanation in a manner so as to meet the expectation of most of his visitors howsoever diverse they may be. The effectiveness of visual communication may be heightened by adopting several methods and improving them gradually through audience testing experiments. Proper labelling, effective lighting and use of space and exhibit programming are some of the important means of visual communication. Exhibits of topical interest and events convey ideas of lasting interest. The designing of museum and display of the exhibits have, therefore, to be dynamic. Admittedly all this requires professional training in museology and museography (exhibit programming). But comparable positions in salary and status with that of University staff will be equally necessary, otherwise where will the museums find the people who may deliver the goods.

Having examined the role of a museum as not only comparable to that of a University but in certain respects possessing greater potentiality of communication with a far wider component of community, its adoption in the system of education ought to be an accepted phenomenon. This leads us to the call for more and more museums as an integral part of the University education so that means and methods of imparting instructions are both verbal and visual. At the very outset the instructions, at least in basic disciplines will become more functional and interesting. The visual impact will tend to develop the creative faculties of the mind besides growing a sense of pride in one's mind about his heritage. The education then will be both conceptual and perceptive. It will be far more communicative, and with greater resources, it will not only draw the community to itself but will itself be able to go out of its portals to the masses whose 'inheritance' is preserved with us in the Museums.

Visitors in Museum

KAMAL SHANKAR SRIVASTAVA

In any country, it is possible to build up a network museums and museum services, collecting, identifying, preserving and presenting material for the edification of a wide public—a network in which the smallest unit has just as real a part to play as the largest All sections of the public can be reached by such a network and each museum can do something in the way that experience has shown to be the most appropriate.

The late prime minister Shri Jawahar Lal Nehru said on the occasion of the centenary of the Government museum, Madras in 1951, "The whole point of museums of modern life, is that larger and larger number of people should visit them and learn from them. They should not be confined to the visiting directors of museums from other countries. More and more people should come, learn and in fact facilities for learning should be made, for lectures to be given to the ordinary folk who come there, for guides to explain to them what these things are and arouse their interest in them, especially school children and college boys and girls, that is the main purpose of museum." Thus visitors are the direct media. By means of visitors, museum may express its activities. They are, therefore, very important.

Museum visitors can be divided into those, who already have an introduction to the subject and those who have not. It is the essential function of every museum curator to help the latter, to encourage them to broaden their interests and to find real and lasting enjoyment in so doing.

Types of Visitors

Many museums are finding it an advantage to arrange their exhibits in three 'intelligence' groups. First there are simple and colourful displays to appeal to children, taking perhaps the age of 12 as the upper limit.

For the second and by far the largest group of visitors an adolescent or adult mental equipment is postulated, but with no specialized knowledge.

The third group of visitors comprises of the specialists and experts, who already have considerable practical and theoretical knowledge of a practical subject.

But from different points of views, we may classify the visitors in serveral manners, i.e. according to their literacy, age, nationality, response (mental status), physical standard, habit, self-status, sex and education, geographical situation etc.

(a) According to literacy, visitors may be classified into two categories:
1. Literate, 2. Illiterate.
(b) According to age, visitors may be divided as children, young and old.
(c) According to nationality, they may be natives or aliens.
(d) According to response, they may be alert and indifferent.
(e) According to physical, they may be handicapped, blind, deaf and dumb.
(f) According to habit, they may be regular and casual (irregular).
(g) According to self-status, they may be serious and non-serious.
(h) According to sex, they may be male or female.
(i) According to geographical situation, they may be rural and urban.

Role of Visitors in Museum

The great thinker Vyasa has said in his epic—'The Mahabharata', "The secret of all knowledge, I unfold unto you, there is nothing higher than man."

"Guhyam Brahma Tadidam bravimi
Na hi manushyachchrestithataram hi kinchit"

The supreme consideration in our entire activities in science and art is education of man through museums. Thus visitor is the *Paidos*.

A visitor should receive full courtesy from the museum staff and be greeted with a broad smile everywhere. In fact, he is to be treated as an honoured guest to the museum. It is claimed that the museum supported by public funds must in return be of good service to the people. As A.S. Wittlin writes—"The public museum being a civic institution, the justification of its existence should be measured by its capacity to serve the needs of the people. The common activities by the museums are exhibition, either temporary or permanent. For an exhibition visitors are the backbone; every exhibition must be assembled, arranged and explained primarily for the benefits of the visitor. This is a particularly difficult task. Many museum directors may have only vague knowledge of their visitors' interests and capacity of appreciation. Visitors no longer belong, as in the past, to a clearly defined social group, whose interests and inclinations were familiar, in broad outline at least, to the museum curator. Today, the art gallery or historical museum may expect visitors from all walks of life. Special thought should be given to school-children, the aged, the people from the surrounding country side, and where appropriate, to foreign tourists.

Responsibilities of Museum

Curators should attempt to attract all these groups and should aim at a standard of exhibition which will provide an experience that will enrich their lives and broaden their outlook.

Given the varied interests of his public, the museum should arrange its exhibition either on a subject which will have special appeal for a specific group (in which case, it will be specially designed for that group), or on one related to a general human problem that can be expected to kindle the interest of all groups. To do so is simple in small communities where the museum director lives in close touch with the people and exhibitions can cater to their known interests. It is complex in case of large communities.

This appeal to the visitor and to his capacity to experience is easier because there is no need to assume that he already possesses a certain body of knowledge. On the contrary he should acquire knowledge through the exhibition, not in the same way as he would from school or a text book; in other words not by going through a thought process already worked out for him by others, but through direct contact with the objects themselves (works of art, item of historical interest or antiquities). For all groups a fully equipped museum will provide literature so that some record of the impressions gained and information learned may be taken home after the visit. There will be picture post cards, picture-books for the children, well-written and well-illustrated guide books with plans and diagrams for the general visitors, and detailed catalogues, hand-books and monographs, with appropriate bibliographies for the experts. The museum that brings its collection from all over the world for its visitors, ends by sending these same visitors out into a wider world in quest of knowledge which they never thought of doing before, even in their day-dreams.

It is now generally accepted that a museum may use publicity devices to attract more visitors. A curator, however should not forget that his task is not so much to sell as to use the choice resources of the museum to disseminate knowledge and enable the public at large to appreciate it.

Brilliant inaugural ceremonies and receptions help to make a museum and its permanent and temporary activities better known to the public.

Role of a Museum

Of the many functions of a museum, the most important is the search for knowledge in its myriad facts. Sustenance and furtherence of it and dissemination of the same among the masses.

In the days of old, the temples, and all other places of worship served not only as the rallying points of the society but also as social, cultural, and educational centres. In course of time this role of the temple has been considerably diluted and passed on to museums in recent times. Now museums have come into their own to serve the community as educational and social institutions.

Duties of Visitor

Museums welcome inquiries from the general public to maintaining cordial relations; these may be about the opening and closing hours of the museum, some particular specimens in the museum-collection or the technical help of the members of the staff in deciphering, dating and identifying the archaic material.

The subject matter of a museum for the general public may be best described in the following words of A.N. Whitehead, "there is only one subject matter for education and that is life in all its manifestations." In India, the great bulk of adult visitors are illiterate and the great bulk of children are literate; and museum collections have been assembled for all. Therefore good guides are a prime necessity.

We should create an awareness amongst the public in respect of their relationship with the art specimens displayed in public galleries. This can be done through labels, preferably multi-lingual or at least trilingual, i.e. regional language, Hindi and English.

Suggestions for Improvement

Guides, fluent in local dialect, Hindi, English and a foreign language should be employed for the benefit of all types of visitors. Guides ought to be courteous. Film show should also be introduced. Generally display should be in interesting manner. No entry fee should be levied; for our people are poor. At least, on one day in a week, say Sunday, there should be no entry fee.

Charts, diagrams, maps, Audio-Visual aids, guide books, etc. are helpful for adults. Children should have hobby centres for handling, modelling, entertainment by casettes (tapes) etc. and film show, colour lighting etc. will attract them. Guide should be considerate and capable of expressing his ideas in simple and captivating manner. Young lady-guides will be ideal. For old people seating arrangement, lift (electrical), public toilets should be introduced.

In Museum publications meant for visitors, technical terms, verbosites, vagueness, repetition should be avoided.

For visitors public address system, cloak room, cafetaria, pictures, post cards, western type toilets, telephone booth, and common room should be introduced, for the physically handicapped wheeled chairs, lift, easy stairs, proper lighting, first aid facility etc. should be provided. For blind, deaf and dumb, there should be separate arrangement or day for their visit, and also museo-bus facility, signalling system, feeling aids (touching the objects etc. should be managed. Serious visitors like researchers, scholars etc. should be allowed to see the reserve collection, catalogues, card indexing, documents and newly arrived objects.

Lastly we should not forget that *Vox populi, Vox dei.* Thus museums should be alert to public needs and respond to these promptly—*virtute et fide.*

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Museums of Anthropology in India

SUJIT SOM

Anthropology as a subject in educational curriculum of the country was introduced as early as 1921 in the University of Calcutta by the then Vice-Chancellor Sir Ashutosh Mukhopadhyaya. So it has a history of just sixty two years. But Anthropology as a subject of museum presentation dates back to historical past. In the beginning the concept was centreed around the personal collections of curiosities. That was the formative period when emphasis was given mostly on uncommon, indegenously designed tribal artefacts, as curios. Inclusion of non-tribal objects are not uncommon but rare. Gradually new objects have been added to project technological skills, form or design, quality, variability of objects/ artefacts. With the inclusion of this traditional concept of museum as "store house" or house of curios begins to diversify and emergence of museums of anthropology became thus possible. Since then addition of museums under such typology are continued even to recent years. It is only in the post-independence era due consideration has been given by various agencies for understanding the social significance of Anthropological museums in knowing more authentically.

In doing so three dimensional exposure of Man (i) man the zoological specimen; (ii) man in the process of evolution; and (iii) man the culture bearing specimen, needs to be given due consideration for total exposure of man. But due to unavoidable reasons museums having anthropology as a branch are mostly of unipattern, leaving associated branches either in abeynce or out of exposure for lack of adequate orientation. An attempt has been made in this paper mainly to highlight the prevailing situation along with allied informations about the Anthropological musuems in the country, to ascertain the position and state of affairs of such museums and if possible to assess the tasks ahead. In fact, this was felt necessary to streamline the various anomalous conditions prevailing in dealing with this type of museum.

Retrospectively, the museum which has emerged out in Calcutta in the early hours of 18th century and had guided the museum movement in the counrty in fact incorporated most of the discipline alongwith anthropology. The anthropology that was initiated there is basically the ethnographical part of the empirical science by describing life in terms of material cultural traits of respective ethnic groups. Since then a series of such museums even with some addition and alternation in the flow of changes have been added. However, from the data so far gathered by the author and listed in table 1, it is found that artefacts pertaining to anthropology are well in existence in various forms for public awareness. Altogether there are 70 museums of various composition and affiliations so far in existence which can in some way or other be termed as museums of anthropology. Depending upon the nature of control, coverage etc. such museums may be categorised as national, regional, zonal, composite, departmental, local, municipal types of museums. Excepting a few museums it is found that coverage is not in conformity with the accepted specificity of sciences of man.

In this respect mention may be made of departmental museums attached to the post-graduate and under-graduate teaching departments of anthropology, though functionally those departmental museums do not serve the basic purpose of the museum i.e. public view, but their existence itself furthers the importance and ideas of its necessity in disseminating knowledge to a particular section of the society. Further, museums of anthropology got momentum when the Anthropological Survey of India, the only research and teaching (advanced) department under the control of Union Govt. had initiated holistical exposure of man most thematically in a planned manner by establishing several zonal anthropological museums and a central anthropological museum with the idea to depict the evolutionary sequences of man, diversity, adaptation etc. and to collect, preserve, document and present the rich cultural heritage of the tribal people of respective zones vis-a-vis a total perspective. Projections of tribal life at different planes are also found in most of the state's museums and museums under the control of Tribal Research Institute, Local administration, Private agencies etc. Recently, an innovation of Bhil Culture Museum at Alirajpur, Madhya Pradesh has incorporated altogether a new pattern of uni-ethnic museum of anthropology in the country, under the control of local municipality, where detailed ethnography of Bhil, a major tribal group in the state of Madhya Pradesh, has been dealt in their set ecosystem. The task has further been boosted up with the introduction of the National Museum of Man by the Union Govt. where the Saga of Man is being depicted three dimensionally in indoor galleries as well as in an open air prehistoric setting. Emphasis is mostly given in exposing Man holistically from the days of emergence of man till to-day. In the process man has undergone a number of changes and developments to attain his present position, the trend, to some extent latently, is still continuing. As such it is very much essential to document and project man in his proper perspective, thereby the functional specificity, archival responsibity and cultural repository of the anthropological museums is achieved. Of course, any attempt to open such a museum will be a matter of great appreciation if concerned authority is very much conscious and consider in the light of above discussion the totality of the subject, it is expected that the deficiencies so far left unattended for various reasons, could be minimised for a better and purposive future.

Table 1

LIST OF ANTHROPOLOGICAL MUSEUMS IN INDIA

Sl. No.	Name of the Museum	State	Nature of Museum	Remarks
1	2	3	4	5
1.	Anthropological Museum, Sri Jai Narain Degree College, Lucknow	Uttar Pradesh (1958)	Ethnography	Biological and Anthropological objects covering traditional tribal material objects Area: NA; Collection : NA.
2.	Baroda Museum and Picture Gallery, Baroda	Gujarat (1894)	Composite	An ethnography section having collection of different types of arms, ploughs, ornaments, head dress, household, exhibits, includes Tibet, Japan, Africa, America and Indonesia. Collection 2184; Area 2000 Sq. ft.
3.	Bharatiya Lok Kala Mandal, Udaipur	Rajasthan	Composite	Ethnographic section depicting tribes of Rajasthan and some other tribes of India.
4.	Bharat Bhavan, Bhopal	Madhya Pradesh (1981)	Composite	A section dealing with tribal objects of M.P. Collection: NA; Area: NA.
5.	Bhil Culture Museum, Alirajpur	Madhya Pradesh (1982)	Ethnographic	Deals with Bhil artefacts of Jhabua, Area: NA.
6.	Bhuri Singh Museum, Chamba	Himachal Pradesh (1908)	Composite/Regional	Ethnography section contains from Gaddi, Pangwala, Lahul and Gujjar. Collection: 25; Area 2250 Sq. ft.
7.	Central Museum, Shillong	Arunachal Pradesh (1976)	Composite/Zonal	Containing ethnographic collection covering tribes of Arunachal Pradesh. Collection 1413 ; Area 1700 (Approx) Sq. ft.

1	2	3	4	5
8.	Central Museum, Nagpur	Maharashtra (1963)	Composite	Ethnography section consists of arms and armour, musical instruments, agricultural implements, ornaments, head dress, articles of daily use from the tribes Gond, Korku, Saiga, Oraon, Ahir, Maria and Muria Gond. Collection 2000; Area 1750 Sq. ft.
9.	Central Museum, Jaipur	Rajasthan (1876)	Composite	Ethnography section consists of dresses, arms, ornaments, crafts etc. collected from Bhil, Mina, Gadulia, Lohar and inhabitants of Mewar, Dhunohar, Hadoti of Rajasthan. Collection 1500; Area: NA.
10.	Central Anthropological Museum, Calcutta	West Bengal (1981)	Ethnographic	Ethnographic Collection covering various tribal specimen from all corners of the country. Collection-2000; Area: NA.
11.	Crafts Museum, New Delhi	Delhi (1952)	Craft	Containing traditional crafts including folk and tribal arts of India. Area : NA; Collection : NA.
12.	Departmental Museum, Bangabasi College, Anthropology Dept., Calcutta	West Bengal	Departmental	Enthnography section covering same tribal groups of West Bengal. Collection : NA; Area: NA.
13.	Departmental Museum, Dept. of Anthropology, Barasat College, Barasat	West Bengal	Departmental	Ethnographic Specimen covering selected tribal group of state and plaster cast model of racial groups. Collection: NA; Area : NA.

1	2	3	4	5
14.	Delhi University, Dept. of Anthropology Museum, New Delhi	Delhi (1947)	Ethnographic	University Departmental museum containing collection from a few selected tribal groups of the country. Collection: NA; Area : NA.
15.	Dibrugarh University, Dept. of Anthropology Museum, Dibrugarh	Assam	Ethnography/Zonal	Ethnographic collection consisting of specimen from local and adjoining tribal groups of the state. Collection : NA; Area : NA.
16.	Departmental Museum, Narasing Dutta College, Dept. of Anthropology, Howrah	West Bengal	Departmental	Ethnographic specimen of some tribal groups of the state & Plaster cast Model, Collection : NA; Area : NA.
17.	Ethnographical Museum of Tribal Research & Training Institute, Pune	Maharashtra (1962)	Ethnography	Containing articles of material cultural value of the tribals of Maharashtra in particular and exhibits of ethnographical value in general. Area: NA; Collection : NA
18.	Gujarat Museum Society, Ahmedabad	Gujarat (1961)	Composite	Containing objects of Anthropology and ethnology. Area : NA; Collection : NA.
19.	Government Museum, Thiningo Karnain, Pudukkottai	Tamil Nadu (1910)	Composite	A section of Anthropology, covering local tribal, Area : NA Collection : NA.
20.	Gauhati University, Dept. of Anthropology, Museum, Gauhati	Assam (1948)	Ethnography Regional	Ethnographic Collection covering most of the local tribes as well adjoing tribes. Collection : NA, Area : NA.

1	2	3	4	5
21.	Indian Museum, Calcutta	West Bengal (1841)	Composite	Anthropology Section contains specimen covering Andamanese, Onge, Nicobarese, Adi Goro, Khashi, Naga, Dafta, Maria, Mishmi, Kannikar, Urali, Birhor, Santal, Riang. Besides some specimen obtained from South-East Asia, Burma, Tibet, Polynesia. Collection : 12360. Area 13100 Sq. ft.
22.	Junagarh Museum, Junagarh.	Gujarat	Zonal	Ethnography section contains art works from Junagarh. Collection : 82, Area : 116 Sq. ft.
23.	Kutch Museum, Kutch	Gujarat (1887)	Zonal	Collection of works of art and industry of Kutch and neighbouring areas. Collection : 4000 (approx); Area : NA.
24.	Lady Wilson Museum, Dharampur	Gujarat	Composite	Small collection of ethnographic specimen covering dress, ornaments, arts, crafts, musical instruments and tribal specimen from Kukana Naika, Dhotia, Dubla, Rabri, Warli and Toda, few specimen from Maori of Newzealand. Collection : 1800 (approx) Area : 3863 Sq. ft.
25.	Lucknow University, Dept. of Anthropology Museum, Lucknow	Uttar Pradesh (1950)	Departmental	University departmental ethnographic collection from local and adjoining tribal groups of the state. Collection : NA; Area : NA.

1	2	3	4	5
26.	Museum of Goa Daman & Diu, Panaji	Goa	Composite	Having a section with art object of anthropological importance. Area : NA; Collection : NA.
27.	Museum of Picture Gallery, Vadodara	Gujarat (1894)	Multipurpose	Containing a section of Anthropology; Area : NA; Collection : NA.
28.	Madras Government, Museum, Madras	Tamil Nadu (1851)	Composite	Large enthnography section containing prehistoric tools, leather sadon play figure, arms and weapons, musical instruments and tribal material objects from all major tribes of South India and other parts of India. Collection 24000; Area 11,869 Sq. ft.
29.	Mahant Ghasidas Memorial Museum, Raipur	Madhya Pradesh (1875)	Composite/Zonal	A small ethnographic collection covering specimen from aboriginal tribes of Chhatisgarh. Collection : NA; Area : NA.
30.	Manipur State Museum, Imphal	Manipur (1969)	Composite/Zonal	Ethnography collection covering arms, weapons, textiles, dress, ornaments, household articles of tribals of Manipur. Collection : NA; Area : 2000 Sq. ft.
31.	Mizoram State Museum, Izwal	Mizoram	Composite/Zonal	Ethnography collection, covering material objects of Mizoram tribes. Collection : NA; Area : NA.

1	2	3	4	5
32.	Museum of the Cultural Research Institute, Calcutta	West Bengal	Ethnographic/Zonal	Ethnographic collection covering arts, crafts, dress and material cultural objects from most of the West Bengal tribe. Collection : 1000 (approx); Area : 800 Sq. ft.
33.	Museum of Tribal and Harijan Research Institute, Bhopal	Madhya Pradesh (1973)	Ethnography/Zonal	Ethnographic collection covering dress ornaments, musical instruments, agricultural implements, household materials from most of the tribal group of Madhya Pradesh. Collection : NA; Area : NA.
34.	Museum of Tribal Research Development Institute, Chhindwara	Madhya Pradesh (1954)	Ethnography/Zonal	Ethnographic collection covering dress, ornament habitation, arms and hunting weapons, arts, crafts, agricultural implement, musical instrument, household materials, paintings, model depicting life and activities of most of the tribes of Madhya Pradesh. Collection : 2500 (appox); Area : NA.
35.	Museum of Tribal & Harijan Research Institute, Ranchi	Bihar (1954)	Ethnography/Zonal	Ethnographic collection covering arts, crafts, musical instruments, dress, agricultural implements, arms, weapons, etc. of Santal Munda, Oraon, Ho, Kharia, Sirhor, Paharia Asur, Kharwar, Malpaharia, Sauria Paharia, Chik-Barai, Lohar, Mahali. Collection : 2000 (approx); Area : 3500 Sq. ft.

1	2	3	4	5
36.	Museum of Tribal & Harijan Research Institute, Bhubaneswar	Orissa	Ethnography/Zonal	Ethnographic collection covering arts, crafts, arms, weapon, ornaments, musical instruments, various implements from most of the tribes of Orissa. Collection : 2000 (approx); Area : NA.
37.	Mysore Government Museum, Bangalore	Karnataka (1866)	Composite	Ethnography section covering arms, weapons and objects from Far-East countries. Collection : NA, Area : NA.
38.	Museum of Bharatiya Adimjati Sewak Samaj, New Delhi	New Delhi	Ethnography	Ethnographic specimen covering various tribal groups of India. Collection : NA; Area : NA.
39.	Natural History Museum, Trivandrum	Kerala (1857)	Composite/Zonal	Ethnography section containing collection from the Hill tribes of Kerala. Collection : 320; Area : 605 Sq. ft. (approx).
40.	Nagaland State Museum, Kohima	Nagaland (1964)	Ethnography/Zonal	Ethnographic collection covering most of the tribes of Nagaland Collection : 500 (appox); Area : NA.
41.	National Museum, New Delhi	Delhi (1960)	Composite	Ethnography section covering tribal materials from Arunachal Pradesh, Madhya Pradesh Orissa, Bihar. Collection : 4200; Area : NA.

1	2	3	4	5
42.	National Museum of Man, Bhopal	Bhopal	Anthropological/ National	Anthropological Collection, covering Tribal Population of India. Only museum in the country covering whole country in terms of anthropological coverage.
43.	Orissa State Museum, Bhubaneswar	Orissa (1932)	Compoiste/Zonal	Ethnographic section covering specimen from large number of tribes & peasants of Orissa. Collection : 750; Area : 2760 Sq. ft. (approx).
44.	Patna Museum, Patna	Bihar (1917)	Composite/Zonal	A section of enthnology covering tribal groups of Bihar.
45.	Punjab Government Museum, Patiala	Punjab (1947)	Composite/Regional	Ethnography section covering collection of costumes, ornament, footwear, prehistoric tools, magico-religious objects from Tibet. Collection : NA, Area : NA.
46.	Punjab University, Dept. of Anthropology Museum, Patiala	Punjab (1960)	Departmental	University departmental museum specimen from local and adjoining tribal groups and other important specimen. Collection : NA. Area : NA.
47.	Ranchi University, Department of Anthropology, Ranchi	Bihar (1953)	Departmental	Ethnographic collection of Central Indian States and Andaman Nicobar Islands. Area : NA; Collection : NA.
48.	Ranchi Museum, Ranchi	Bihar (1974)	Composite	A section of ethnology containing tribal specimen of the area. Area : NA; Collection : NA.

1	2	3	4	5
49.	Sibsagar College, Assam Museum, Sibsagar	Assam (1950)	Departmental	A section containing traditional Assamese dresses and ornaments.
50.	State Museum, Kohima	Nagaland (1970)	Ethnology	Anthropological specimen from local areas. Area : NA; Collection : NA.
51.	Sardar Ballavbhai Patel Museum, Surat (Formerly Winchester Museum)	Gujarat	Composite/Zonal	Collection contains local textiles and embroidery work from Saurashtra, Kutch, Sind, Punjab. Collection : NA; Area : NA.
52.	Sri Girdhari Bhai Children's Museum, Amreli	Gujarat (1955)	Regional	Ethnography section containing materials of cultural origin mostly of Saurashtra. Collection : NA; Area : NA.
53.	State Museum, Lucknow	Uttar Pradesh (1863)	Composite/Regional	Ethnography section consists of collection from aboriginal tribes of the state mostly their arts, crafts, musical instruments. Collection : NA; Area : NA.
54.	State Museum, Agartala	Tripura	Composite/Regional	Ethnography section covering collection from the aboriginal tribes of the state. Collection : NA; Area : NA.
55.	Tribal Cultural Research & Training Institute, Hyderabad	Andhra Pradesh (1963)	Zonal	Containing typical ornaments, dress, hunting artifacts, utensils, musical instruments and other materials used by the tribals of Andhra Pradesh.

1	2	3	4	5
56.	Tribal Research Institute, Assam	Assam	Zonal	Considerable numbers of specimen collected from various tribes of state.
57.	Tribal Museum, New Delhi	Delhi (1956)	Arts & Crafts	Containing costumes and handicrafts of tribals. Area : NA; Collection : NA.
58.	Tribal Research & Training Institute, Gujarat Vidyapith, Ahmedabad	Gujarat (1962)	Enthnographic	Ethnological objects covering religion, ornaments, day-to-day objects, agricultural implements of the tribes of Gujarat. Area : NA; Collection : NA.
59.	Tribal Research Institute, Shillong	Meghalaya (1974)	Ethnography	Containing indigenous specimens and articles of the tribal people of Meghalaya. Area : NA; Collection : NA.
60.	Folklore Museum, Manas Gangotri, Dept. of Folklore, Mysore University, Mysore	Karnataka	Departmental	A section dealing with ethnographic specimen from tribal population of south India. Collection : NA; Area : NA.
61.	University of Calcutta, Dept. of Anthropology, Museum, Calcutta	West Bengal (1921)	Departmental	University departmental museum containing collection from the tribes of West Bengal and adjoining states. Collection : NA ; Area : NA.
62.	Utkal University, Dept. of Anthropology, Bhubaneswar	Orissa (1958)	Departmental	Ethnographic collection covering detailed material cultural objects of most of the tribes of Orissa. Collection : 2500 (approx); Area : NA.

1	2	3	4	5
63.	Zilla Samgrahasala Haripada Sahitya Mandir, Purlia	West Bengal (1960)	Composite	A section deals with tribal material objects of the adjoining areas. Collection : NA; Area : NA.
64.	Zonal Anthropological Museum, Port Blair	Andaman, Nicobar Islands (1954)	Ethnography/Zonal	Ethnographic collection covering specimen from Great Andamanese, Onge, Jarawa, Sentinelese, Nicobarese and Shempen. Collection : 700; Area : 250 Sq. ft.
65.	Zonal Anthropological Museum, Jagdalpur	Madhya Pradesh (1978)	Ethnography/Zonal	Ethnographic collection of material culture from most of the tribes of Madhya Pradesh and adjoining parts of Orissa. Collection : 2000 (approx); Area : 2000 Sq. ft.
66.	Zonal Anthropological Museum, Nagpur	Maharashtra (1979)	Ethnography/Zonal	Ethnographic collection consisting of specimen from most of tribes of Madhya Pradesh and Maharashtra. Collection : 1500; Area : NA.
67.	Zonal Anthropological Museum, Shillong	Arunachal Pradesh (1979)	Ethnography/Zonal	Ethnographic collection covering most of the local tribes of Arunachal Pradesh. Collection : 800 (approx); Area : NA.
68.	Zonal Anthropological Museum, Dehra Dun	Uttar Pradesh	Ethnography/Zonal	Ethnographic collection consisting of specimen from most of local tribes. Collection : NA; Area : NA.
69.	Zonal Anthropological Museum, Mysore	Karnataka	Ethnography/Zonal	Ethnographic collection covering most of the local tribes. Collection: NA; Area: NA.
70.	Museum of Kerala Institute for Research Training & Developmental Studies, Calicut	Kerala	Ethnographic	Ethnographic materials covering most of tribal groups of Kerala and other areas. Collection : NA: Area : NA.

Documention of the Ethnogrphic Exhibits Displayed in the "Tribal Fair" at Ahmedabad

R.R. GOSWAMI

In order to introduce the colourful heritage of the forest dwellers, the ADIVASIS of Gujarat, a grand tribal fair was organized at Ahmedabad under the auspices of The Tribal Welfare Department of Gujarat state from 12 to 15 of February 1984 consisting of numerous programmes reflecting and representing the vividness and rich cultural values of the age-old tribal traditions, of arts and crafts including dance and music. The fair was a result of the joint efforts more than twenty different state departments and non-government organisations! It included a tribal artists' Artist-Camp, an exhibition showing more than one thousand anthropological objects belonging to the tribals of Gujarat, stage show of tribal dances and a restaurant catering the tribal dishes. The fair was unique in the annals of Gujarat, unique as so far no such programme has been organised and that too for the common man of urban areas to make him aware of his own brethren living beyond the hills in the forests, in their natural surroundings

The demand from other big cities, like Baroda, Surat and Rajkot, to hold this type of fair every year not only indicates the success of the programme but also reflects the desire of the urban people to know and understand the tribals.

The CURATOR, Lady Wilson Museum, Dharmpur along with Hakubhai Shah was directed to contact the tribal artists and craftsmen and to collect the objects for the exhibition. This collection team moved through the whole tribal region of Gujarat, from Banaskantha to Bulsar, contacted hundreds of tribal artists, visited all the representative type tribal villages for two weeks and finally brought objects used by the tribals in their day-to-day life, household equipments, agriculture tools, vessels used for worship, weapons and rods for hunting and fishing and minor forest products used as medicine. This was a unique opportunity for a museologist to observe the objects in its natural context and original environment. Therefore, to exploit the opportunity to the maximum we decided to document the complete collection for museum reference.

To start with, a documentation committee was formed with the Director of museums, Gujarat State as chairman and Curators of Lady Wilson Museum, Dharmpur and Saputara Museum, Saputara, as members.

A format which could cover the all possible data needed for anthropological studies was charted out for documentation. It was also decided to photograph the objects in the field in colour and those in the exhibition hall in black and white.

The documentation work was divided into following stages:-

1. Field documentation,
2. Documentation of Collected objects,
3. Case study of the tribal craftsmen participated in the camp,
4. Preparing a detailed and illustrated catalogue.

The field documentation carried out during the survey tour made the collection for the fair.

When all the collection reached the venue of exhibition a detailed informative catalogue card of each object was prepared.

Similarly, case studies were prepared interviewing the tribal artists who participated in the fair, with all details regarding raw material, preparation, social and economic status of the artists etc.

This whole work was finished within four days. The appendix no. II shows the laborious efforts made and the importance of such type documentation for enriching the references and basic data helpful in museum research. Incidently this documentation is useful to others interested in tribal life.

Appendix I

TOTAL OBJECTS DOCUMENTED:

TOTAL INTERVIEWS OF CRAFTSMEN

TOTAL TRIBES COVERED

All the tribes are sub-groups of main Bhil race, except Siddi, Koli, Kathodi, Warli and Kuknas.

NAME OF THE AREA	TRIBES IN THE AREA
Rajpipla (Bharuch)	Bhils, Nayaka, Vasava, Dhanka, Siddi.
Chhota Udepur (Baroda)	Bhils, Ratva, Koli, Tadavi.
Songarh (Surat)	Bhils, Vasava, Gamit, Chodhari, Mavachi.
Ahva (Dangs)	Bhils, Kunabis, Varlis.
Mandavi (Surat)	Dublas, Kotvalia, Chodhari.
Dahod (Panch Mahal)	Bhils, Patelia, Bamania, Vasava, Rathva.
Palanpur (Banaskantha)	Garasia, Thakarda, Kathodia, Bhils.
Khed-Brahma (Sabarkantha)	Garasia, Bhils.
Vansda (Bulsar)	Dhodia, Nayaka, Warli, Kolch, Kukana.

Appendix II

Schedule showing the total objects documented:

Name of Area Types of Objects	Raj Pipla	Chhota-Udepur	Songarh	Ahva	Mandavi	Dahod	Palanpur	Khed Brahma	Vansda	Total 6666
1. Agriculture Tools	18	14	16	9	25	25	21	25	18	146
2. Hunting Tools	10	5	15	11	xx	10	14	5	5	75
3. Household impliments	33	43	25	20	9	35	26	30	17	238
4. Musical Instruments	7	10	x	2	10	4	11	4	7	55
5. Costumes	4	8	8	x	7	15	8	4	11	65
6. Ornaments	18	15	x	19	26	39	50	30	20	217
7. Religious Objects	3	x	6	x	x	x	x	x	x	9
8. Masks	x	x	x	14	x	x	x	x	20	34
9. Toys	10	x	x	4	x	x	17	x	x	31
10. Mscleneous	x	16	x	x	11	x	x	x	x	27
Total	103	111	70	79	63	128	147	98	98	897

Appendix III

-: Documentation Card :-

Tribal Art and Crafts of Gujarat

Serial No. ....Negative No. ....

Name and Description of Object ....

....

....

....

Name of Artist ....Caste ....

Village...............Taluka ....District ....

Use:-

Who:- Male/Female/Children/Priest...............................

When:- Regular/Occasional

Occasion ....

Tribal who use ....

How long/far can be used ....

How it is used ....

Manufacture:-

Material and media ....

....

Raw material ....

....

Source of material...

....

Preparation and process...

....

....

....

Time required for 1. Raw material preperation........................

2. Final product...

Stages of preparation ....

....

Raw Material Envelop No. ....

Down the Memorary Lane

SMITA J. BAXI

Smt. Indira Gandhi was not only known for her genuine love for Indian arts but she was very dear to the community of village craftswomen and craftsmen of the country. Whenever these '*Shilpkaras*' were in Delhi, their first request to the Crafts Museum was to arrange a meeting with the Prime Minister Indira Gandhi. Invariably these appointments could easily be fixed and the success of the meeting could easily be gauged from the beaming faces of the visitors.

It was due to her initiative that the highest honours like "Padma Shri" were bestowed on village craftswomen and craftsmen along with other artists.

A large group of Kerala craftswomen and craftsmen were working for casting of a "Charakku" a metal vessel in the museum. In spite of her busy schedule, the Prime Minister wanted to be present at the site of the casting for witnessing the great feat of pouring hot metal in the clay mould. It was a fascinating occasion when nearly forty craftsmen went on emptying their pots of molten metal turn by turn, only in the light of the fire as well as the blue flame of the metal.

After the arrival of the Prime Minister, a lot of cameramen rushed to photograph her and craftsmen kept on waiting. She asked me the reason why they are not starting, when I replied that they are waiting for the blue flame, she carefully glanced around and told me that the blue flame is already there; so I had to give her real reason that the craftsmen cannot work while the crowd is around and cameras are flashing. She immediately ordered the photographers to clear the casting area, so the work could start. After the pouring of metal, she went around the museum gallery, seeing the exhibits, and asking quite a few questions about the objects on display and the museum.

The whole process of work done by hands impressed her so much, that the large group of craftsmen and women was invited for breakfast at the Prime Minister's house.

It is known that there are a lot of visitors whowere given the morning time to meet the Prime Minister and the group was dispersed by the Security

Officers after the Photograph. As soon as she saw that the group was being sent away, she called the Security man in-charge and reminded him that the craftsmen were invited for breakfast and should be sent to the lawns behind the building. Accordingly the group was led to the lawn where they were served a delicious breakfast of dosas and idlies along with hot coffee and tea. The Prime Minister again joined the group enquiring after their health, their work and their difficulties. The craftsmen were so happy and proud of this meeting that they kept on talking about it for days.

Another occasion of her unscheduled visit is also unforgettable. I received a telephone call at home one evening that the Prime Minister is likely to visit the complex. I reached the Museum entrance when the party arrived. The Pragati Maidan entrance of the Museum abuts on the Crafts-demonstration area. She first went around, met the craftsmen and enquired after their work, prospects and difficulties, when she was presented with samples of their creations, in clay, she told them that she lives in a small house and she can't preserve all these beautiful objects. It was very amusing for the craftsmen to find out that the Prime Minister lives in a small house, but they persuaded her to accept their gifts, replicas of many specimens displayed in the exhibition of terracotata and pottery 'form and many forms of Mother Clay' which she had specially come to see, since she had heard about it. The visit was so enjoyable for the craftswomen, craftsmen and all of us, since there was no crowd and no disturbance from cameramen.

Technique of Glass Making at Firozabad and Some Other Centres in India

O.P. AGRAWAL AND TEJ SINGH

In ancient Sanskrit literature, there are many references to *kacha* (glass) which show that glass was known in India in remote antiquity. However, the earliest archaeological remains of glass in India come from Maski Period I (beginning of 1st millennium B.C.) in a chalcolithic assemblage[1]. In the next cultural phase of Indian History, the Painted Grey Ware (PGW) Culture, glass is reported from Hastinapur phase II, Alamgirpur phase II, Rupar and Sravasti (middle of 1st millennium B.C.).[2] We find that in this period itself glass was being widely used in India, as evidenced by the large glass finds and the location of the glass yielding archaeological sites. Very shortly after the end of the PGW culture we enter into a definitive phase in the history of ancient glass in India during the Mauryan period. Besides Taxila, examples of Mauryan glass are available from many sites in India like Maheshwar, Patna, Ujjain, Kaushambi, Hastinapur, Rajghat etc.

In the Post-Mauryan period, the early centuries of the christian era have been the most affluent period for the spread of the use of glass in India. Several new techniques in the mode of fabrication and new colours were introduced. In the Gupta and post-Gupta period, popularity of glass waned and it was no more considered valuable and hence there was a decline in glass industry, in general. The use of glass and ceramic objects again picked up in medieval period and the technology of glass making reached a new height during the Mughal times.

Though scientific studies of glass remains from various sites have been done by some workers but these studies were limited only to the composition of glass with respect to major elements and some conjectures about possible colouring ingredients, and information on most aspects of ancient glass technology in India still remains scanty.

The National Research Laboratory for Conservation of Cultural Property, Lucknow has taken up a major project on the study of ancient Indian glass and, therefore, it was considered important, in the first place, to study the present day cottage industry techniques of glass making in India. Firozabad, a town in Agra district of western Uttar Pradesh situated at 27°9'N and 78°23'E is famous for its glass industry and a report on the present day technique of glass making in Firozabad is presented here.

Firozabad Glass Industry

The present day glass industry of Firozabad and adjoining areas is still in a cottage industry form. The work even today is done with only hands and some primitive types of tools, without the use of any machinery whatsoever. It is likely that the techniques practised at Firozabad today are broadly still the same as were used some 2000 years ago.

At the end of the last century glass bangles were being manufactured at Jaleshar[3], a town very close to Firozabad. But now the centre of glass industry has shifted to Firozabad, which has become the main trade of the town. There are a number of glass factories in and around Firozabad. Most of the factories manufacture mainly bangles. However, some factories, usually the larger ones, are engaged in the manufacture of other objects as well.

Furnaces

The furnaces are usually bottom-fired employing coal as fuel. In larger furnaces where a big batch of glass melt is to be prepared, heat is applied from sides also and therefore the furnace differs in construction somewhat. The bottom of a small size furnace under construction can be seen in fig. 1. The construction material is ceramic brick employing coal ash and lime as mortar. The small vents on both the sides of the gate are for the passage of air.

A furnace used for preparing colourless glass melt is normally used for preparing colourless glass only where the material is kept in one single big tank. Coloured glasses, which are generally melted in smaller batches, are melted in big ceramic pots kept inside the furnace. Thus glass of different colours can be melted simultaneously inside one furnace without chance of any cross-contamination of different colours. The use of these pots also avoids the general contamination of the furnace by the coloured glasses. A pot once used for a particular colour can be used again and again for the melting of the same colour. Temperature of the furnace is assessed only visually without the help of any temperature measuring device.

Raw Material

Main ingredients of colourless glass are soda ash, lime, borax, potassium nitrate and sand. For producing coloured glasses, other ingredients are added in small quantities. The combination of chemicals and their mode of addition for producing coloured glass still remain a trade secret. Artisans who have mastered the technique of making beautiful coloured glasses manufacture these glasses in concentrate form in their own factories and sell to other factories to be added to transparent glass melt or to be used as decorative colour on transparent body of glass articles. They also sell premixed material to be melted to produce coloured glass. Babbar Ustad, a veteran artisan of the town, while talking enthusiastically about the art and history of bangle-making gave the following information on the preparation of coloured glasses, still maintaining the secrecy about the intricacies of the art:

1. For red and yellow coloured glass, stone powder of light buff colour from Bundi Kota (Rajasthan) is used while for other colours, reddish sand obtained from Gangapur (Rajasthan) is used.
2. Arsenic Oxide is added in all types of glass except red coloured ones.
3. In case of red and yellow coloured products prepared by using Kota stone powder, borax and postassium nitrate '*shora*' are added after the glass melt is almost ready. In other cases, borax and potassium nitrate are added in the beginning itself alongwith the other ingredients.
4. For green colour, ferrous sulphate is used.
5. Copper metal turnings are used for blue colour.
6. Cadmium sulphide and cadmium selenide are used for yellow and red colours respectively. In this case a little zinc oxide is also added.
7. Titanium dioxide and antimony oxide are used for white opaque colours.

Technique of Bangle-Making

Bangles are made both of the transparent colourless glass and of the transparent coloured glass decorated with different combinations and arrangements of coloured opaque glass (es).

The glass melt called *mal* is taken on the tip of a long iron rod from the side opening of the furnace and rapidly cooled in a bowl containing an emulsion of castor oil and water. The water getting evaporated in the process is replenished by a continuous and slow supply from a small tank provided just above the bowl containing the emulsion (Fig. 2). As the glass cools down, it adheres to the iron rod firmly and a desired shape can be given to it while it is still red hot. This mass of glass taken on the iron rod tip for working is called *lom* and the artisan preparing *lom* is called *lomwala*. The *lom* is then given a rectangular shape with slight tapering towards the end (Fig. 3).

For decorations, the opaque coloured glasses are applied (Fig. 4) as semi-molten strips in various colour combinations and arrangements. This is largely decided by the fashion trend of the day. Putting coloured streaks on the inner side of the transparent body of bangles is a very popular combination these days. The *lom* is further heated and given a conical shape (Fig. 5) by the artisans called *pelwala*. In case, an opaque coloured streak is to be provided inside the transparent glass body of the bangle for special colour effects, the *lom*, after application of the coloured glass strip, is heated and more transparent glass melt '*mal*' is added around the *lom*. The artistic consideration in the work of *pelwala* is that he has to maintain the colour configuration on the surface and the inside of the *lom*. The *lom* is then taken to *tarkash*, who is considered the most skilled artisan engaged in the industry. Here it may be mentioned that a large number of artisans is working at different points under the factory shed. The *lom* is carried from one artisan to the other by bound labourers in such an harmonious and synchronised way that all the people are engaged all the time without any interference amongst themselves, in spite of too many of them working at one place and nowhere a *lom* is left unattended.

The *tarkash* sits in front of a small furnance '*bhatti*' (Fig. 6) for drawing wire (*tar*) from the *lom*.

The inside of the *bhatti* nearer to the *tarkash* is heated by burning coal. The *tarkash* puts the tip of the *lom* (Fig. 7, as seen from the back of the furnance) on a thick iron rod called *belan* which is being rotated by *belania* (Fig. 8) at a constant speed. The *belan* is threaded on the side nearer to *belania*. While *belan* is being rotated it also moves towards the *belania* at a constant rate and in the process, the *tar* coming out of the *lom* gets wound on the *belan* in a spiral form (Fig. 9).

Since the shape to the bangles is given at this stage the work of *tarkash* is considered to be the most important. The *tarkash* controls the thickness of the bangles by putting *lom* nearer or farther from the heat source and the *belan*, and maintains the colour arrangement by holding the *lom* at a particular angle. This is a highly skilled job and requires the control of several parameters at a time. The amount of glass taken as *lom* is adjusted in such a way that one *lom* suffices for making one spiral of the size of the *belan*. When the spiral is complete, it is taken out from the other end (Fig. 10). The spiral is then cut with the help of a glass cutting diamond edged blade (Fig. 11) and bangles are sorted out in different grades of thickness while the broken ones are rejected. The bangles of different thicknesses are then tied together to form *todas* (Fig. 12).

Then follows the work of joining the cut ends of the bangles which is done usually outside the factory premises. The ends are fused together after heating on a pressure kerosene stove. For decorations, the cut work and painting is done in residential houses. Menfolk engage themselves in cutting, while painting is usually done by ladies. The golden paint is called '*hull*' and the painting technique, in general, is called '*hulkari*'. The paint (*hull*) is a very dilute gold solution which on heat treatment reduces to metallic gold and adheres firmly to the body of the bangle. Few decades back the daily consumption of gold at the Firozabad factories was nearly 5 Kg which, at present, with the introduction of golden colour paints, used in inferior quality products, has reduced to approximately 2 Kg per day.

Fabrication of Other Objects

Other objects of common usage like lamp chimneys, tumblers, jars, flower-vases, etc. are done by blow technique.

The glass melt *'gulli'* is taken at the tip of blow pipe and blown slowly. The *gulli* while still very soft is kept inside a mould and blown hard for the *gulli* to attain the shape of the mould. The object is taken out and the edges finished. The finished object is kept inside a furnace heated at a low temperature, for annealing.

For the sake of completeness of the report, traditional glass making techniques practiced at some other centres in India are also included here.

GLASS WORK AT KAPADVANJ[4]

Kapadvanj, a town in Kaira District of Gujarat has a history of not less than 300 years of glass making and had a flourishing trade in glass during the early 19th century.

The artisans at Kapadvanj used *oos*, a natural earth containing mainly carbonates and silicate of soda along with other mineral impurities, for manufacturing glass in olden times. But at present, only broken glass is used as a basic raw material because it works out to be cheaper.

Earlier, finished products like jars, chimney, tumblers, mirrors, decorative glass objects etc. were being manufactured at Kapadvanj. But, now with the introduction of large mechanised glass industries, the market has become very competitive and at present the artisans at Kapadvanj only manufacture zinc, tin and lead coated glass globe mirrors which are used in embroidery work known as *abhala bharat* or *shishdhar* embroidery. It is also used in ornamental decoration of wall and earthen pots particularly in Gujarat.

For manufacturing silvered glass pieces for use in *shishdhar* embroidery an artisan sits near the narrow gate on the left side of the furnace. He collects some molten glass on the tip of the blowpipe with the help of the bent end of an iron rod called *ankado* and cools it by sprinkling water on it with the help of *pochari*, a 1-1/2 feet long woolen handle with cotton cloth wrapped on the one end. The blowpipe is turned on a wet iron plate to distribute the molten glass evenly in the surface. After allowing it to cool, the rod having some paste sticking to it is again dipped in the molten glass and the desired quantity of glass is taken and placed on the iron plate. This process is repeated several times. When sufficient quantity of viscous glass (approx. 1 Kg) is collected, the artisan blows the pipe while turning or rolling it on the iron plate or moving it round in the air till the paste is moulded initially into an oblong shape.

The blowpipe is then passed on to another artisan for further blowing into a hollow globe. While blowing, the artisan places it in the furnace off and on to retain the plasticity of the moulded lump. When the desired thickness of glass is obtained the flask is placed on a bowl shaped clay stand and the blowpipe is pulled out, making an opening for pouring molten metal mixture for silvering. The blowpipe is then pierced at the bottom of the flask and the molten metal mixture (Pb : Zn : Sh :: 80 : 10 : 10) is poured into the flask through the opening on the top. The flask is now rotated with the help of the blowpipe to spread the molten metal evenly on the inner surface of the flask. Extra molten metal is taken out by turning the flask upside down. The globe is cooled and the blowpipe is taken out after beating it with an iron strip.

The globe is then broken into smaller pieces and the pieces are sorted out according to their thinckness.

Furnace (Bhatti)

While designing the furnaces, two factors viz. kind and quality of glass to be manufactured are considered. The tank furnace is constructed with clay and brick in oblong shape under the tin-roof of the workshop without walls. The furnace is broad from the front side and narrow from the rear. There is a big gate in the front, which is used to enter the moulded and shaped flask for further heating and processing. At right angle to the front portion, a small niche is provided for melting the lead, tin and zinc in a spoon like implement. The side gate falling on the left side is used for dropping raw materials and also for collecting viscous glass for primary rolling and shaping. At the end of the furnace, in the semicircular opening beneath the side walls is the dropping point for fuel. Size of an average furnace tank is 30′×12′×6′.

The raw materials are put into one of the two compartments of the furnace, whereas the fuel is kept in another. The mixture is heated and stirred occasionally with the help of a spade called *Pavdi*. The solid mixture takes the viscous form on the third day.

Techniques and Processes

Glass making at Kapadvanj is done without the help of any machinery, solely by human labour with the help of traditional tools and implements.

GLASS BANGLES OF TARAPUR[5]

Tarapur, a village in Palghar taluka of Thana district, is situated at 19°50′N and 72°42′E, and is one of the two centres of bangle making in Maharashtra. During 1938-39, there were about 35 *bhattis* (furnaces) in Tarapur which used to manufacture glass bangles, but in December, 1964 there were only 3 *bhattis* engaging 20 workers.

Furnace (Bhatti)

Bhatti is located in the workshop which is a temporary structure covering an area of 20x20 feet. The *bhatti* which is wood-fired is located at the centre of the workshop and is circular in shape at the base. It is a dome-like structure with an opening at the top, perhaps to work as a chimney.

A pit is dug upto a level of 2½ feet and through an opening fire-wood is inserted inside the *bhatti*. There are in all 6 openings around the conical walls of the *bhatti*. Of these, 2 which are meant for *lom bananewala* (i.e. the person who prepares molten glass mass from sheet glass), are square in shape and of the size of 1x1 foot. The other four which are used by *jodnewale* (i.e., the persons who weld the two ends of the glass rod and give a circular shape of a bangle to the rod) are of circular shape. In front of each opening, apartments are made with low walls, each one made for an individual worker. There is a shelf running all around the inner wall of the *bhatti* which is used by the workers either to keep the pieces of sheet glass, enamel glass or pieces of glass rods for heating. In order to protect the eyesight of the *lom bananewala* who is exposed to the heat of the furnace more intensely than the *jodnewala*, there is a device to cover the opening used by him.

Raw Materials

The main raw materials required in the manufacture of glass bangles at Tarapur are:-

(a) Pieces of sheet glass of various thickness.
(b) Pieces of coloured glass enamel.

Manufacturing Process

There are various processes in India by which glass bangles are manufactured, viz. (a) hand-made jointed bangles, (b) roller-made jointed bangles, (c) hand-made jointless bangles, etc. The craftmen at Tarapur follow the first method, which is described below:-

A *bhatti*, around which almost all the operations are carried out, gives employment to 8 persons if it is worked to its full rated capacity. Of the 8 persons, two are called *utarnewale* or *lom bananewale*. These are the skilled craftsmen who melt pieces of sheet glass and unless this is done, further operations cannot be commenced. There are two other workers who are designated as *tar ihenchnewale* (i.e. the persons who draw glass rods with the help of *badana*) and are attached, one each, to the two *lom bananewale*. Their duty is to draw the glass rod with the help of a *badana*, out the long pieces of glass rods into smaller ones of uniform length, supply these pieces to four other persons who are known as *jodnewale*. The function of a *jodnewala* is to weld the two ends of a small piece of glass rod and form a bangle. In other words, on a *bhatti* (if it is working with a full complement) there are teams and the members of each team are:-

(a) *Lom bananewala* (one)
(b) *Tar Khenchnewala* (one)
(c) *Jodnewala* (two)

Before the workers manufacture glass bangles, there is a process which is essential in the craft and that is the manufacture of "coloured glass sticks" which are used as "colouring agents" in the manufacture of glass bangles. These "coloured glass sticks" are manufactured by mixing pieces of sheet glass and coloured glass enamel. This process is described below:-

The *lom bananewala* takes the required quantity of pieces of sheet glass and a proportionate quantity of pieces of coloured glass enamel. The craftsmen are unwilling to give out their proportion as they intend to keep it as a trade secret. However, it is seen that the proportion of sheet glass and coloured glass enamel is 5:1 by weight. The *lom bananewala* keeps these pieces on the shelf inside the *bhatti* for heating. At the same time he keeps the iron end of the *salakh* inside the *bhatti* so that it too is heated. When he is sure that the coloured glass enamel stones are heated sufficiently (the craftsmen come to know when the enamels attain the required temperature just by seeing its colour, he picks up these pieces one by one with the help of the *chimta* and dusts them with cotton rags and gathers them at the end of the *salakh*. Since both, the end of *salakh* and the coloured glass enamel, are quite hot, the latter sticks up to the end of the *salakh*. In this manner he gathers all the coloured glass enamel pieces around the end of the *salakh*. When this is done, he (so to speak) wraps these coloured pieces in the pieces of sheet glass which were so long inside the *bhatti*. Just as he had earlier cleaned the pieces of coloured glass enamel before taking them on to the *salakh*' he cleans the pieces of glass sheet with cotton rags and then envelopes the coloured pieces with the pieces of the sheet glass. The *lom bananewala* then presses the 'mass' with the help of the *ghan* by keeping it on the steel plate. In this process, the mass of coloured glass and sheet glass get cooled a bit and so he once again keeps it inside the *bhatti* for heating. Then, he takes it out and presses it with the *ghan*. In this manner he 'sandwiches' the coloured enamel between the layers of sheet glass. However, this is not enough. The aim of the *lom bananewala* is to obtain a thorough mixture of the two components. He obtains this thorough mixture in the following manner. When the solid mass is inserted inside the *bhatti* after repeated pressing, he pierces the hot bent end of the *akoda* into the mass which is red hot and draws a thick rod from it and then wraps this rod around the mass at the end of the *salakh*. He repeats this process in quick succession, the operation being done inside the *bhatti*, till he is satisfied that the two components are mixed thoroughly. The test of a thorough mixture is the homogeneous mass which is visible to a layman's eye when it is red hot. When his aim is fulfilled, he disconnects the *akoda*, keeps the mass inside the *bhatti* for a while and then takes it out and gives it a conical shape by repeatedly pressing the molten glass with the help of the *ghan*.

When this shape is obtained he places it inside the *bhatti* for heating and then takes a *badana*, heats its pointed end a bit and pierces it at the point of the mass and draws out a rod of glass by pulling it. He draws the coloured rod. It is not necessary that the rod should be of uniform breadth or thickness or length since it is to be cut again into small pieces and used as colouring agent. The length of the rod drawn by the *tar khenchnewala* is seldom less than 120 feet. By the time the *tar khenchnewala* reaches the limit, the rod becomes cool. It is then cut into small pieces of definite length depending upon the size of the bangle to be prepared by means of a file.

These small glass rods are then passed on to the *jodnewala*. The job of a *jodnewala* is to weld the two ends of the small pieces of glass rods by first heating them inside the *bhatti* and then placing them on the *kalabut*. He keeps 5 to 6 glass rod pieces, one at the side of the other on the shelf inside the *bhatti* with the help of the *chimta*. After they are quite hot, he picks up the first piece of glass rod with the *chimta* and places it on the *kalabut* which is also inserted earlier into the *bhatti*. Due to heat the glass rod becomes soft and when the *kalabut* is rotated, it takes a circular shape. However, before the *kalabut* is rotated while it is inside the *bhatti*, the *jodnewala* presses the two ends of the glass rod with the flat bent end of *akoda*. Since they are hot the two ends are welded together. He then rotates the *kalabut* with the help of its handle when it is inside the *bhatti* and after a few rounds the bangle takes a round shape. He then places the bangle on the flat iron plate, and in case the shape is irregular he gently presses it with the *chimta*. He then takes out the next rod from inside the *bhatti* and repeats the above process.

The designs in the bangles are obtained by placing the coloured glass sticks at different places on the glass sheet. Different designs can also be obtained by mixing more than one colour or by drawing thick or thin glass rod. The names given to the designs are in local language and the craftsmen could not offer any historical background for the origin of their names.

CONCLUSION

The NRLC has taken up a major project on the study of ancient Indian glass technology. At Firozabad (Uttar Pradesh), Tarapur (Maharashtra), Kapadvanj (Gujarat) and some other centres, glass articles are still being manufactured using only traditional tools and techniques without the use of any machinery whatsoever. The present study of the technique of glass making at these centres as practiced today will be a guide line in understanding the glass technology of India in ancient times.

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Technical Section

An Approach to Preventive Conservation

C.B. GUPTA

Introduction

Museums are repositories of the priceless heritage of mankind. They serve as an index of civilisation, and must be preserved for posterity. Any loss to such a material is irreplaceable. If such material lack favourable environment, they undergo chemical and physical changes which lead to their decay and total destruction. Presentation serves no useful purpose, if it is inconsistent with the policy of conservation. The task of presentation and preservation must go hand in hand because both are interlinked. The major problem of preservation include, control of temperature and humidity (especially to prevent sudden variation), protection against atmospheric pollution and biological hazards, especially from insects and micro-organisms. All museum materials can be divided into two cateogries.

Organic and Inorganic

Stone, metal and ceramics are inorganic material while, wood, paper, textile, leather, ivory, bone, feather and other objects derived from living beings are organic in nature. Inorganic material is less prone to natural decay than organic material and therefore, much care has to be excercised in the preservation of the latter. The term conservation broadly speaking consists of three main aspects : (1) Preventive measures (2) Curative measures (3) Restorative measures. In this article preventive measures of only organic materials are discussed.

The health and safety of collections

Museums are not supposed to be mere store houses of antiquities but are considered as preservation centres of cultural heritage. Besides, they play an important role in educating masses. Museum personnel have an imperative duty to take intelligent and effective care in handling their collection both while the objects are in store and are on display. Very often it is felt that preservation is the job of the chemist or conservator and restorer; this may be true in those cases where objects are generally received in good condition and need little or no treatment at all. In such cases preventive conservation is more helpful to prevent further decay. Neither traditional techniques nor modern methods can extend life of objects, such as primary care and proper maintenance can, even if the best conservation facilities in the world, are on hand. The approach should be given priority.

It is therefore, recommended that the incharge and custodian of the art object should take up the following preventive measures which arrest the natural processes of deterioration and prevent accidental damage:

1. Periodic physical inspection of objects in their charge.
2. Adequate storage arrangement for the objects already in the collection.
3. Maintaining the right degree of temperature and relative humidity in exhibition rooms and store rooms, in order to prevent and control climatic fluctuations. Proper lighting arrangement to avoid decay due to photochemical action.
4. Preventing accumulation of dust and the action of obnoxious gases.
5. Periodic fumigation, sterilization to combat the problem of insects and micro-organisms.

These preventive measures protect museum objects of art and culture from the influence of factors that tend to cause the destruction.

Adequate Storage

It has been seen that store is the most neglected part in museum. Unfortunately we have come to accept store as a structure of secondary importance and we tend to treat objects placed in the store on the same lines, as the famous saying out of sight out of mind. A clean, uncluttered and well organized storage area plus periodic maintenance of it may be more important in the long run. A crowded storage area results in damage to the objects.

1. A distinction must be made between ordinary store and a museum store. In a museum store, objects of one type should be stored side by side, at one place and not one upon the other. There should be adequate storage space.
2. The storage area should have adequate and proper lighting arrangement, smoke detector, proper lifting and transporting equipment and effective security system. The store should be clean, well ventilated and humidity controlled. Dirt heaps and nutrient materials such as soap, wax, paper, glue, edibles etc. invite unwanted insects. A periodic check is the best control device. It will reduce the threat of insects.

A fire proof storage area is ideal, but it may not be possible. The fire hazard can be minimized by a few precautions. Do not smoke in storage area. Do not store the organic objects near heating pipe or radiators. Have fire extinguishers of the dry chemical type of carbondioxide gas type; the fire extinguisher can be used in case of emergency, but the apparatus should be inspected periodically to keep it in working condition.

Since water damage is almost as destructive as fire, due precautions should be taken against leaking roof or pipe of the water reservior and the roof of the store room properly checked if the objects are in basement; the lowest shelves should be well above known flood level.

It should be remembered that items housed in a museum store should be regarded as of equal importance and value as those on display in the museum.

Packing and Transportation

For packing of art objects, wooden boxes are to be preferred to iron sheet boxes. The reason for this preference are many. Wood is not only lighter in weight, it can absorb shocks in a better way than iron sheets. The iron containers can be crushed between heavy boxes and get damaged easily thereby endangering its contents. While wooden boxes are heat and cold resistant, metal sheet container can easily get hot and cold. As a matter of precaution, heavy containers should be strengthened with metal e.g. iron angles and screw for the lid as this will minimize vibration and eliminate shocks in opening and closing the case. Other precautions needed for packing art objects is water proofing. To prevent penetration of liquids and dust, the inside of the case should be lined with tough, water proof paper which should not come in contact with the objects or the whole box should be lined with water proofing paper. To avoid dampness, cloth packets containing silicagel should be kept inside the boxes. Before putting the objects in a box the objects should be wrapped in tissue paper instead of wrapping directly in cotton or wool, because the fibres of wool and cotton enter the cavities of the objects and the removal of fibres again creates problems.

It is better that the box be lined with thermocol sheets to make it heat and cold resistant. Thermocol works as a cushion and absorbs shocks thereby ensuring safety. Each box must be provided with a packing list. It would be better if photographs of the objects are also kept inside the box.

If textiles are to be sent out the curator must know about the material and its weight and the method of fabrication so that he can decide if the objects are to be folded, rolled or creased. In case of transportation of wooden objects which is worm-eaten or full of mends due precaution should be taken to see that it is given more padding, if necessary.

When the object is to be removed from one place to another a trolley should be used. Padding must be kept on the trolley to protect the objects from avoidable shocks during transportation. A tall wooden object with a small base should never be transported on a trolley in a standing position. It must lie flat, otherwise it may fall. The trolley carrying an art object in a museum must be moved slowly and enough hands must be available to lift or to place the objects on the trolley.

Atmospheric Pollution and Cultural Property—A Report on the Seminar Organised by the Salar Jung Museum

D. BHASKAR RAO

The Salar Jung Museum organised a seminar on Atmospheric Pollution and Cultural Property on 5th June, 1983, which was celebrated as World Environment Day. Shri Syed Hashim Ali, Vice-Chancellor, Osmania University and Member Salar Jung Museum Board presided over the seminar. Dr. M.L. Nigam, Director, Salar Jung Museum, initiated the topic of the seminar followed by five scholars from different walks of life who shared their ideas and suggested certain guide-lines for the preservation of cultural property from atmospheric pollution. Later Shri Syed Hashim Ali, delivering his presidental address, summed up the points of the speakers and putforth his suggestions also.

Intiating the topic Dr. M.L. Nigam said that the basic idea of organising the seminar is to gather facts and suggestions which will serve as a guideline to preserve the art objects located in Museums and else where as well as monuments scattered all over the country. Due to rapid industrialisation the atmosphere has got so much polluted that the balance of nature is disturbed; and this has its effects not only on cultural property but on other things too. As the custodians of cultural property it is out foremost duty to take proper precautions to preserve them for future generations.

Dr. P.M. Bhargava, Director, Centre for cellular and Molecular Biology, Hyderabad said that both cultural heritage and pollution are products of history. Cultural property faces two types of destruction, natural and man-made. Man is, in a way, responsible for polluting atmosphere, water sources, land etc. The pollution is sometimes direct and happens when industries give out obnoxious gases in the atmosphere.

If one traces man's history from the point of view of his encounter with nature, one would conclude that man has gone through three stages of development. The early first stage was stone age and before when man was totally at the mercy of nature. Then came the second stage when man, as a result of his own development of invention of science and technology, began slowly to learn how to control nature. But at this second stage also nature was still supreme in the sense that nature had a regenerating capacity and whatever damage was done to nature, nature regenerated it. Some three hundred years ago man entered the third stage: the damage that man did to nature was so large that nature simply could not regenerate it.

He suggested in terms of solutions the following:

To our great dismay no proper work has been done in our country on the chemistry of pollution. It is time for starting a systematic study on a continuing basis of pollution and its effects on various types of materials and identify those pollutants that is going to affect our cultural heritage. (2) There should be clear legislative acts. (3) The time has come for setting up a commission, which will be concerned entirely with the pollution of artifacts and preservation of cultural heritage. The commission should start a study all over the country to know what are the various materials that have been used to build our cultural heritage of various kinds i.e. bronzes, miniatures, textiles etc. This commission should have administrative powers and legal powers, so that it can take action in case of violation immediately without resorting to the normal procedures of law.

Shri Ramesh Grover, I.A.S., Commissioner for Industries, Government of Andhra Pradesh, observed that this problem has been brought to focus by the danger to the world famous Taj Mahal at Agra from the obnoxious gases emitted by industries located in and around it and the installation of the Mathura Refinery. Contamination of environment has become a world-wide problem. The setting up and rapid growth of industries like petrol, chemical industries, oil refineries, iron and steel plants, fertilizer plants, thermal power stations, textile factories, foundries and chemical factories etc. and that too located in densely populated areas which discharge smoke, dust, and industrial gases causing atmospheric pollution. This air pollution has damaging effects on plants, human beings, animals and the other materials.

The damaging effect of air pollution on materials with particular reference to monuments of historical importance is of great concern. In India building stones, especially marble, is attacked by oxides of sulphur in polluted air in the presence of moisture. Due to this blistering, flaking, and oxidation takes place. The presence of grit and dust further accelerates corrosion. He explained in detail by taking the example of Taj and the damage caused by polluted atmosphere.

Referring to the Charminar, the famous monument of Hyderabad, he said that the area is the terminus of a number of city bus routes. Air, moisture and sulphur fumes emitted by automobiles is blacking the upper portion of the minaret, while the cumulative vibration are responsible for falling of the plaster.

In Andhra Pradesh the State Board for protection and control of pollution which was established in 1974, has been entrusted with administering air pollution control act. While administering the industries already in existence it envisages that new industrial development should be planned carefully and should be located far from the cities and towns to ensure effective control of air pollution.

The HUDA, some 2.1/2 years back, had taken up the study of identification of important monuments which would need protection. It had already identified some 142 monuments and buildings which are of historical, social importance. They have worked out details of the protection means including legislative means that would need to be taken by the State Government.

Besides this, public awareness should be created about the cultural heritage and its protection not only from atmospheric pollution but also from other dangers like vandalism, theft etc. public awareness without it would not be possible for us to achieve anything concrete.

Dr. Krishnasastry, Director of Archaeology & Museums, Government of Andhra Pradesh, said that cultural heritage belongs to two types, viz. movable and immovable. While the art objects like painting, bronzes, coins, etc. belong to the first group, monuments come under the second group. He described in detail the measures taken for the care and preservation of monuments from pollution as well as other factors.

Shri Venkateshwaran, Archaeological Survey of India, Hyderabad, explained about the discoloration in marble due to air pollution. He cited examples of both Indian and European monuments.

Shri M.S. Mathur, Chemist, Salar Jung Museum, Hyderabad, said that in the broader sense atmospheric pollution or air pollution means the presence in the outdoor atmosphere of one or more air contaminates or combinations thereof in such quantities and of such duration as are or may tend to be injurious to cultural property which may be present in a Museum, repository or lying open in the field.

Air contaminates include smoke, vapours, charred paper, dust, soot, grime, carbon fumes, gases, mist, odours, particulate matter, radio-active materials or any other material in outdoor atmosphere.

The problem of air pollution is not a new one. In the history of air pollution we find several instances and orders dating from 13th century onwards in different Western countries for control of air pollution. In the history of Indian sub-continent the fresh and foul air has been described as *khushbu* and *badbu*, we get a lot of references of this polluted air during Moghul times. But the real problem has cropped up due to rapid industrialisation now..

More damage has occurred to Indian monumnets and antiquities in the last 30 years due to industrialisation than in last couple of centuries. Nitrate, Sulphate, Chloride, and other salts grow upon crystallization and if initiated in a small crack the force of this growth can enlarge the crack and cause the stone to crumble.

Paint dyes are also attacked by pollutants and colour changes or fading occurs. Paper products produced from about 1750 onwards are enbrittled by sulphur compounds as they are converted to sulphuric acid. The pollutants are also responsible for the deterioration of metallic objects, buildings and building materials and textiles.

In India industry is now developing and is polluting a clean atmosphere. If the growth and location of industry is planned properly, our monuments and antiquities will remain safe and we may not have to spend large sums for their preservation. But conditions are quite contrary in this country and we do not care to see towards our culture and try to save them from the vagaries of pollutants, may it be Taj Mahal in Agra or Charminar in Hyderabad.

The methods of controlling the level of pollution differ from pollutant to pollutant and from antiquity to antiquity and monument to monument.

For saving our cultural property there are several methods but they are too expensive. It is better if we nip the trouble in the bud and do not allow the atmosphere to be polluted. Otherwise costly methods of cleaning and preservation will have to be employed at a very very high cost after the damage is done to our cultural property.

Shri Syed Hashim Ali, in his presidential address observed that Indians should develop a better sense of responsibility and appreciation of their rich cultural heritage. Lack of awareness in preserving our monuments in good order brings great loss of our cultural heritage. According to him the only recourse to this is to create awareness among people.

Ethnological Collections, Conservation Problems and their Solution in Government Museum, Madras

V. JEYARAJ

Ethnological materials form one of the major collections of Government Museum, Madras. Their maintenance, display and preservation are the various facets of conservation in general. The conservation problems vary from object to object due to the nature of materials and environmental conditions. The objects are of varied materials, different types and are from different localities. The well established Chemical conservation and Research—Laboratory of Government Museum, Madras preserves the ethnological objects both by physical and chemical means.

Types of objects

The ethnological collections of Govt. Museum, Madras are mainly of tribal materials. They are not very old. The different materials used are of organic, inoragnic origin, and metals like iron, copper, brass, lead, gold gilted copper. Single object sometimes may be a combination of various materials like metals, glasses, textiles, beads. To name a few, in the collection there are feathers, horns, hair, fur, leather objects, dark cloth, traps of different types, bird drill, baskets, broom, gourd vessels, palm-leaf objects, water bottle, rope ladder, loin cloth, leave dress, purse, kernel vessels, wooden tops, battle axes, sickles, tournettes, fire making devices, reed pen, pointed styluses, pellet bow, harpoons, bows and arrows, boomerangs, flute, percussion instruments, hoe, plough, necklace of chowries, bracelets, anklets, brass images, copper objects, iron implements, etc.

Environment

Madras has the tropical climate. The Government Museum, Madras campus is a big one with an area of more than 12 acres with number of trees all around. On three sides vehicular traffic is allowed. The ethnological collections are kept on the first floor and in halls which are large with very high ceiling. Most of the objects on display are kept within show-cases. The store is a compact room where the reserve collections are kept in cupboards.

Types of decay, deterioration and damage

Since most of the objects are organic in nature, they decay naturally due to age; improper choice of materials etc. deteriorate due to various agents and get damaged. The various agents in action are dust, humidity, temperature, biological agents like fungi, moss, lichen, liverworts, mildew, insects.

Dust

Even though the campus of the Govt. Museum, Madras is a large one with large number of trees, dust accumulation is considerable. This is due to the summer winds, inflow of large number of visitors and vecicular traffic on three sides outside the campus. During May, June, July and August, the dust accumulation is much more than in other months. The accumulated dust gets hardened due to high humidity and discolour the objects in due course.

Relative humidity and temperature

The most suitable range of relative humidity for museum objects is 45% to 60%. Generally the relative humidity is very high, i.e. above 90% during January, July, August, September, October, November and December. The value is very low upto 27% during the month of June. In May and July also it is comparatively low at the range between 40% and 30%. There is always a difference in the relative humidity and temperature inside and outside the galleries. In the case of showcases both the factors are controlled to some extent. The relative humidity inside the store room is some what uniform due to its compactness. The suitable temperature for the objects is 20°C to 25°C. But the temperature at 8.30 a.m. is above 40°C during May and June and is low upto 20°C during January and December. The temperature at other times goes upto 41.7°C and falls as low as 19.1°C.

Recording of temperature and relative humidity was done in the laboratory, gallery and in the store. For outside temperature and relative humidity, the data available with the observatory of the Indian Meteorological Department, Nungambakkam, Madras which is at a short distance from the museum is given.

Biological agents

The high relative humidity and temperature favour biological growth on the objects. Sometimes during rainy season some objects get soaked in water and become vulnerable for fungal, mould growth, etc. The aspergelous

TABLE 1

R.H. and temperature recorded at 8.30 a.m. at Nungambakkam Meteorological Centre.

Month	1979		1980		1981		1982		1983	
	R.H. %	Temp. °C	R.H. %	Temp. °C	R.H. %	Temp. °C	R.H. %	Temp. °C	R.H. %	Temp °C
JANUARY										
Max.	93	29.7	88	32.1	93	31.4	93	29.7	91	30.1
Min.	67	27.7	53	28.5	65	28.1	65	27.8	50	28.5
FEBRUARY										
Max.	88	33.6	88	32.6	91	33.3	91	32.1	86	33.1
Min.	62	29.1	74	29.7	76	29.1	76	28.7	63	30.4
MARCH										
Max.	84	34.7	96	35.6	84	33.3	84	33.6	81	36.5
Min.	54	29.7	59	31.8	65	30.3	65	31.6	67	31.2
APRIL										
Max.	82	39.1	82	36.7	84	39.4	84	38.6	81	36
Min.	63	32.7	67	32.9	69	33.1	69	33.3	62	33.1
MAY										
Max.	88	40.2	84	42.6	83	42.1	83	41.3	86	43.1
Min.	52	30	37	34.7	50	34.5	50	33.8	52	34.7
JUNE										
Max.	73	39.2	80	39.4	95	40.1	95	41.4	87	42.6
Min.	48	32	46	34.5	51	31.6	51	35.1	44	34
JULY										
Max.	92	38.4	93	40.5	93	38.7	93	39.1	93	38.2
Min.	53	31.4	52	32.5	53	31.1	53	34.4	57	31.1
AUGUST										
Max.	92	38.1	97	35.8	95	35.8	95	36.9	98	36.2
Min.	50	27.7	59	32.6	60	31.3	60	32.1	63	31.8
SEPTEMBER										
Max.	93	36.1	92	37.5	98	33.9	98	36.8	96	35
Min.	64	29	53	32	54	30.6	54	31	68	31.3
OCTOBER										
Max.	93	38.1	96	35.8	98	34.5	98	35.6	100	35.4
Min.	64	28.5	63	29.2	69	26.6	69	30.5	60	23.5
NOVEMBER										
Max.	100	31.4	98	31.4	97	31.6	97	32.8	97	32.1
Min.	69	24.6	65	26.2	56	26.6	56	29.5	55	29
DECEMBER										
Max.	95	30.9	100	29.7	91	30.6	91	30.1	100	30
Min.	66	26.2	64	22.8	56	26.8	56	28.1	64	24.4

TABLE 2

Comparison of R.H. and Temperature

DATE	Chemical Conservation and Research Laboratory, Govt. Museum, Madras.		India Meteorological Centre, Nungambakkam, Madras.	
	R.H. %	Temp. °C	R.H. %	Temp. °C
17/10/79	76	27	77	32.3
18/10/79	74	26.5	75	32.2
19/10/79	76	26.5	79	31.1
20/10/79	72	27	64	32.7
21/10/79	74	27.5	83	33
22/10/79	80	27.5	80	32.2

TABLE 3

DATE	Ethnological Gallery R.H. %	Nungambakkam, Madras R.H. %
3/11/84	64.5	81
4/11/84	67	81
5/11/84	68	85
6/11/84	65	73

is the most dominating fungal species generally found. The colours of fungi found are blue, bluish green, green, yellow, orange, brown, black. The portions affected by fungi get softened and lose surface coating and sometimes the objects get discoloured and stained permanently. Cockroaches sometimes leave their excreta on the objects. Besides these silver fish is found every where. The spider webs distract the appearance in the show cases. They attract dust very quickly. In the case of closed and insect repellent kept show cases this menace is less. Experimentation shows especially in the case of reserve collections if the objects are not attended to for a month the cobwebs grow more with dust and the objects appear as if they have not been cleaned or dusted for years together.

Preventive measures

Prevention is better than cure. So preventive care is mostly taken by the respective sectional staff. Periodical inspection of the objects by the technical staff in charge of the collections is done every day and the dust and other things are removed carefully and systematically. The Curator for Chemical Conservation inspects the objects along with the Curator concerned and proper preventive measures are taken systematically. If any objects are affected by any means those objects are taken to the conservation laboratory for curative preservation.

With proper care by the staff there probable damage to objects on display is to be averted. While fixing the objects along the panels inside the show cases iron nails, iron wire, etc. are to be avoided. Instead nylon threads, copper or brass nails are to be used. The ethnological objects are to be kept mostly in show cases to avoid damage due to high relative humidity and to avoid human touch. Direct sunlight is mostly to be avoided inside the galleries.

Curative preservation

Curative preservation is of two types, both physical and chemical.

Generally the tribal objects collected direct from their provenance are fumigated in an airtight fumigation chamber using Thymol, Paradichlorobenzene or carbon-di-sulphide for a week. Vacuum cleaner is used for cleaning certain objects. Insecticides like Benzene hexachloride, D.D.T., Ascu are used. Insect repellents like Thymol, Paradichlorobenzene, naphthalene balls, carbon-di-sulphide etc. are used. Fungicides such as mercuric chloride, paranitrophenol are in use. If any symptoms of biological attack is found, immediately they are shifted to the fumigation chamber and the dead insects are removed and the insect holes, if any, are filled with insecticides mixed in molten paraffin wax. Naphthalene balls are kept inside the show cases in specially designed boxes to avoid insects to a great extent.

Chemical preservation

As the objects are made of different materials treatment for them also varies. Normally ethnological objects are fashioned from metals like iron, brass, copper, lead, silver, gold gilted copper, etc. When the object under treatment happens to be of leather, wood, metal, textile, etc. extreme care is to be taken to treat them individually.

Most of the tribal objects are organic in nature and crudely made and therefore get damaged very easily. The leather portions get hardened. Objects made of feather, hair, fur etc. are cleaned with rectified spirit and coated with 2% glycerol in rectified spirit. The leather portion of percussion instruments are cleaned with teepol in rectified spirit and given a coating of 1% castor oil in rectified spirit with a pinch of paranitrophenol as fungicide.

The wooden portions are normally covered with greasy black dirty materials and accumulated dust. Sometimes they are found with holes due to attack by insects. These objects are cleaned with rectified spirit, the holes if any, are filled with paraffin wax mixed with a crystal of D.D.T. and then coated with a 2% solution of polyvinyl acetate in toluene.

The costumes used by certain tribes are displayed in the gallery using life size models and hence the tear is much avoided. Those textiles which are not displayed with models are taken for fumigation regularly. The textiles are brushed off to remove the dust and other unwanted materials with a soft brush. A dark cloth found affected by fungi was kept in the fumigation chamber and fumigated with thymol for a week and cleaned with brush. Again for a week it was fumigated.

Beads, glass portions, shells etc., are cleaned with hydrogenperoxide. Necklaces or such ornaments which have provision for removal of shells, beads, metal portions, etc. the components are removed and treated separately. Protective coating is given to the parts and later they are formed together to their original shape. In cleaning such small things the use of ultrasonic cleaner is commendable with teepol in water.

The protective coating given in earlier days was paraffin wax in turpentine, celluloid coating. The protective coating in use at present is a 2% solution of polyvinyl acetate in toluene either by brushing, spraying or by immersion as the case may be. It is seen that the protective coating given does not give any glassy appearance.

Conclusion

Museums were mainly interested in Art and Archaeology much and hence the laboratories attached to them attended to the preservation of such objects. But there are art objects in their ethnological collections which also should be preserved for the posterity. Since much of the ethnological materials are organic in nature more attention has to be given in preserving them.

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Museum Publications

SUDHAKAR SHARMA

The publication department of any Museum, developed or developing, is a small one. But just as a small switch can set in motion and control an enormous machine or an electrical system carrying power to remote areas, publication department is also a "key". The functions of a publication department has been compared to that of the producer of a film or play, or the conductor of an orchestra.

Museum publications are an important media for propagation of culture and art. India has a very rich heritage of art and culture. This may be conveyed to all those living in the remote corners of our country and also to far and wide places of the world through faithful reproductions of our antiquities and publications authored by scholars in various fields of art and culture.

Museum publications are different from other publications. In these publications great stress is laid on quality of reproductions of the antiques. The quantity published at a time is no doubt small but the quality of reproductions should be comparable to the originals to convey faithfully the interpretation of the writer's concept. There are three kinds of publications which a museum may indulge in. The first type is the outcome of serious researches conducted on the objects and published in the form of monographs or books. The other type of publication is meant to familiarize the visitors, both experts and lay, with the museum and its functioning by publishing its reports, catalogues, guide books, introductory leaflets and so on. Besides these two regular publications there is a third category also which a museum would undertake casually on special occasions, say an anniversary, inauguration of some new gallery, special exhibitions, etc. to popularize itself within the community. In general, the publications of museums are of the following types:

Bulletin—It is intended to keep the public informed of the activities of the museum. It covers a vast range of subjects like description of the current activities, announcement of important acquisitions, notices of special exhibitions, lectures, etc.

Journals—It mainly contains scholarly articles on various aspects of the museum collections or their arrangements. Here the departmental notes, book reviews, notifications and announcements are of secondary interest.

Short Guide—It is designed to give an overall brief picture of the museum arrangements and its collection. Besides, a brief historical background and short account of various departments and sections, along with the description of some prominent exhibits.

Catalogues—Catalogues are of two kinds, i.e. scholarly and popular. A scholarly catalogue is a list of objects with their technical details and illustrations while the popular one is devoted to the list of exhibits with an introduction and, if possible, a few illustrations. In addition, there may be acknowledgements, foreword, bibliography, list of donors, index of artists, etc.

Hand-Books—They are of two kinds, viz. general and special. A general handbook gives a brief outline of the museum, while the special handbook may deal with a gallery or a special collection.

Brochures—These are most common type and popular of all museum publications devoted to specific subjects with reproductions of the best specimens.

Picture-Books—These are collections of photographs of the best specimens in a museum with brief description of each under a colourful background.

Folders/leaflets/guide maps/colour picture post cards—These are various other means adopted by museums to acquaint people with the current and special activities of the museum.

Marketing of museum publications

The museum publications mentioned here are brought out for the benefit of art students, critics and scholars so that the result of research conducted in the museum reaches a wide audience. It is essential that the results of research obtained at one centre should be made available to research workers all over the world, as quickly as possible. However, good the research, report or survey may be, it is of no use if the printed material lies in the godowns of museum and does not reach national and international markets.

It is here that the role of marketing comes in. Museum publications have, on the one hand, an unlimited market and, on the other, a very limited number of potential buyers. The market is unlimited in the sense that such publications can be sold to hundreds of universities, research centres, and institutions of higher learning spread all over the world. On the other hand, the number of potential buyers is limited, as these books are not meant for laymen.

Thus the promotion of museum publications poses the problem of contacting the large number of research institutions and a limited number of research workers and scholars interested in the particular subject spread over a number of countries. This means that a vast publicity organisation is needed to tackle this work. Here are a few steps that should be taken for the proper marketing of museum publications:

1. There should be well-planned and well-produced publicity material for each title. It should contain full information about the book, the author and should preferably have the table of contents.

The material should be mailed to the universities, colleges and addressed to the Heads of the Departments of the subjects concerned in addition to the librarians.

2. Review copies should be sent to eminent people who are specialists in their fields and efforts should be made to get reviews from them though it may mean a reminder or two which most reviewers do not relish.

Review copies should be sent to professional and specialised journals.

Books should be displayed at seminars and conferences held in different states every year. Attractively produced catalogues should be freely distributed on such occasions.

Review copies meant for internationally known journals should be sent preferably through the foreign distributor as he can always be helpful in expediting the review. In the case of review copies sent abroad the name of the distributor in that country should always be given as the readers would know where to get the book from.

After a few months when the reviews are published, they should be located and compiled in the form of a brochure and again mailed to possible buyers.

Mailing list of scholars other than those working in universities and colleges should be prepared and the publicity material should also be mailed to them.

In order to induce more and more booksellers to stock and sell such books, the discount offered to the trade should be generous. It should range from 25% to 33.3%, depending on the number of copies purchased.

Without incurring much cost regional exhibitions should be arranged in museums. Some museums think that because their books are of scholarly nature, they can afford to present them in a shabby get up. It is not so and the book must be well-produced and presented with-salable appeal in the jackets.

As far as the advertising is concerned, it does not pay to advertise them in dailies or in periodicals. It is useful to advertise such publications in specialised journals. However, it is always useful to advertise them in book industry journals which immediately come to the notice of librarians and booksellers and they have wide circulation all over the country and abroad.

Regular information should be sent to firms which specialize in bibliographical services. This invariably helps in the publicity of the book without incurring any cost.

The publication of more and more scholarly books on even the remotest of subjects would create better conditions for the growth and development of education and the spread of knowledge. It is, however, interesting to note that in recent years a situation which demands a change in the existing condi•

tions is rapidly developing. Even some of the very small museums have started taking up scholarly and research publications. This modest change in their attitude to publishing is bound to prove beneficial to the country in general and to the world of knowledge in particular.

There is also a need for bringing scholarship down to earth. As, by their very nature and size, the scholarly and research publications are heavily priced, they fall out of the reach of an average, though specialized reader. It would be worthwhile to market some of the more significant scholarly museum publications in cheap paperback editions or bring out condensed easy to read versions of the same.

Museum Photography—Composition, Creativity and Communication

P.K. SAHA

The major uses of photographic images in a museum can be grouped into two classes—display of photographic image relevant to the theme of the gallaries and the very popular use of this medium for the purpose of publicity and publication of the exhibits and activities of a museum. Successful accomplishments of the different assignments related to these two aspects depends mainly on three different principal factors. They are proper knowledge of photographic composition, aptitude and atmosphere for creative efforts and communication in proper perspective among all those involved in the process.

A plain enlargement in the process of becoming a full-fledged museum exhibit gets evolved with unusual format to ascertain accommodation in a specially designed space. Hence the point of consideration here is non-traditional and exceptional. What is needed is not to make a good composition like a classic pictorial masterpiece but to ensure accommodation in the desired space and format without the slightest deterioration of thematic expression. To accomplish this not only clear knowledge and masterly application of certain commonly accepted guidelines are required but also certain advanced techniques and manipulations. Taking proper care of margins, looking after all details to arrange in a systematic manner, giving prominent place to the objects of importance, allowing space to express movability, arranging the objects in different shapes related to marginal lines for different emotional expressions, proper placement of horizons etc. are a few guidelines in this respect. For displaying a photographic exhibit without losing its thematic expression, the conception that the same picture can stand for different ideas with the change of the composition etc. should be clear. The objects to be photographed irrespective of their sources are obviously to be recorded either in square or rectangular format.

This square or rectangular form of image is to get the desired shape of the specifically fabricated showcases—may be oval or cone-shaped, triangular or hexagonal. To achieve this wide varieties of manipulations are required.

The need for extension and reversion of background is commonly felt and there are quite a few popular methods of getting the background extended or reverted. The selection of an appropriate one to serve the specific purpose keeping in view the chemical and physical properties of the positive or negative material to be dealt with is necessary.

To display a photograph of a fossil stone in a hexagonal space, firstly, a positive print of optimum size can be made on paper-back material, the outer edge of the stone can get separated from the original background and fitted on a background suitable in size and colour. A re-exposed and retouched negative will produce a brilliant print for the final display. In this case only the background gets a hexagonal shape and the stone remains with all its effectiveness. Any darker shade of background will give the picture on display a natural look. But an exhibit of a butterfly sitting on a flower needs a natural background and it should certainly be slightly out of focus. So here the selection should be more accurate and the same method of getting the final print as mentioned above can be followed. Another way is of preparing a print from the original negative on a big sheet leaving optimum white space all around, and then a painter can do the necessary extension work matching with the original. The painted area should be absolutely realistic. If the handmade background fails to convince the eyes of a professsional photographer this process should be avoided without any hesitation and as such the alternate solution is to search for a similar photograph whose background is suitable for the purpose or this can be exposed separately, and then to follow the same process mentioned above or to superimpose it in the dark-room.

With the technique of super imposition and preparation of black or even darker background together it is technically possible to create many desirable effects. Such a proper combination of techniques removes many hurdles. Another unique material is graphic art or lith films which in fact encourages the aptitude for creativity. Among the many ways of preparing a black background of desired grade and tone one very useful process that serves well in accordance with this specific need is to make two prints of the same object keeping the magnification constant—one negative and the other positive. Cutout of the principal object is then transferred in proper place of the negative print. The master negative comes from the re-exposure of the retouched positive. This process is easy to follow when one or two objects are required to be transferred. The reverted background though black maintains certain grade and tone and this is necessary to record better tonal effect. Simple reversion of background on certain occasions adds contrast resulting in bright tonal effect in the final print. This process has additional application for super imposing line diagrams on continuous tone print.

Using the bare cutouts masked in negative carrier with glass is another way of getting a complete black background. This method is particularly useful for composing objects from different photographs, places or illustrations together. The finer and sharper the edge areas of the cutouts the better is the final out come. Fine scissors is a suitable tool for this purpose. A small aperture should be used. Otherwise strong intensity of rays emitting through the black areas of the carrier blur the edge areas of objects. To get rid of such faulty outcome the good quality of the final print is ensured with test strips exposed with variation of both "F" number and duration of time. Negative carrier also should be masked properly.

A blank underexposed, properly developed and fixed film can also be used for the preparation of background of greyish or black with certain tonal gradation. When materials like quick fix, stick fast are used for joining the cutouts with cut-holes, due care should be taken to keep the cutouts free of finger prints. If this is difficult these can be directly put into the negative carrier and handling the pieces can be done with a soft, zero number brush.

The two simple ways for making a background white or light are: (1) blocking the desired area with intransparent dye, (2) Vignetting. The simple technique of vignetting can also be applied for the preparation of black background. It is needless to say that the objective behind the appliances for all these processes is to get appropriate enlarged background which alone will provide the desired shape for use in the showcase and thus enable to accommodate an exhibit in specifically designed showcase without any deterioration of thematic impact or expression.

Keeping aside the matter of irregular formats, very common shape, even maintaining the desired proporation with all the elements required in display in formats of regular shape like a rectangle is a question of clever manipulation and is often just not possible by plain enlargement. I remember one occasion when a photograph of a grassland was lacking proper proportion for a specific space. Vertical length was falling short after having the optimum enlargement of the horizontal length. Any further enlargement was not possible to keep some important objects within the horizontal length of the display area. All I did was to re-expose the photograph in a nearby lawn including some identical grass in the fore-ground. When a final hand coloured print on diapositive sheet of optimum proportion was made with proper dodging from the retouched negative neither the dark-room assistant nor the senior display staff could point out this manipulation till I revealed it. What I mean by all this is that photographic representation in a museum has communication objective. The whole trend of creativity bends to convince the thirst for constructive art to give new ideas, success for the photographic representation which mainly depends on vivid apprehension of the objectives behind the initiation of this medium to display an exhibit. This realization evokes longing for proper utilization of many techniques and processes to yield a very desirable form in the whole display; and it is also the starting point to become aware of the gap between effort and achievement. This growing consciousness urges one to engage in experimentation along "Try and see" process and application of the right one at the right place to maintain spontaneity.

Often when I go around the gallery viewing the photographic exhibits they remind me many of the difficulties I had faced and the simple technique of overcoming them. I understand that creativity in museum photography is not confined to making a good picture but to give a new photographic shape of a specimen which had been clicked many times earlier. I realise the importance of the silent words that are exchanged with the coming tones; I admire the vision of the man who works in the dark.

The second vital use of museum photography is for publicity and publication. This includes the coverage of exhibits and exhibit showcases of the permanent exhibition gallery. While photographing the exhibits of a permanent exhibition gallery, it is necessary to take into consideration the various aspects of proper perspectives of exhibit showcases, dioramas, gallery views etc. Here composition and perspective are so inevitably correlated that one could not be studied without the other. While composing a frame for a diorama proper attention should necessarily be paid for recording a level horizon and the perfect perspective of the three dimensional foreground objects which need proper selection of viewing angle and the camera height. It is worth mentioning in this connection that these factors should be taken into consideration while exposing the films in the camera and once the film is exposed they cannot be corrected while making prints as it is done on some occasions for pictorial photography. For reversal material this theory is applicable not only for photographing a diorama but to all kinds of photography.

The exhibit showcases for photographing a general view of an exhibition gallery, that come in the marginal area play an important role for balancing the whole frame and for a good general view this is a vital factor to look into. Besides, other factors like insufficient space, glares, zigzag flow of circulation etc. do not permit proper composition of the frames. Aptitude for creativity is the only key for solutions to all these problems.

Photographing in the gallery is not only for maintaining photographic record of an exhibit. It is also for a compact and visual representation of the whole display to show its lively flow of rhythm. The viewing angle of the camera is selected not only to record the whole objects or to obtain a good picture free of glares but with a strong desire to add some more elements which is seen only in the mind of the person behind the camera. A good shot can come only when a synchronisation occurs between the insight of a man operating the devices of the sophisticated light box and the speed of the shutter.

It is true that unlike pictorial photography the scope for creativity in museum photography is confined to serve only specific purposes and motivated, certainty not art for art's sake. But for a creative eye a museum gallery can be the venue for excellent candid work. The third eye of a photographer can see rare expressions and moods of the visitors who are from every walk of society. Their immediate expressions at the first sight of an exhibit on some occasions is really so very amusing and thrillingas well to record on a light sensitive plain surface. Children who are very curious about everything around them can be good targets and help produce masterpices of candid photography. Patience and aptitude for catching rare occasionsof expressions are required. Frame should be composed and exposed before the subjects become aware of the presence of a camear as once they become camera conscious every thing is proved too late. Another vital factor is the light condition. Flash photography cannot help in any way for such shots. Clicking in the existing light for such shots is always recommended. Flash if not planned properly with elaborate arrangement not only diminishes the light and shade effects provided by the existing illumination unit but also helps the people to become camera conscious more easily. Solution certainly lies in using high speed films. Here again we have our limitations. Whereas many countries in the world are using extra high speed films like 3200 ASA and films of multiple speeds we face some difficulties to get occasionally even a film of 400 ASA.

The different types of communication that ace professionals feel necessary are identified as : (1) to communicate essentially in proper direction with a group of people of different disciplines who are involved in the process of feeding precisely all the information both in regard to art and science vital for fabrication of museum exhibit in a photographic process; (2) to study and understand how the basic guidelines of photographic composition, perspective and the outcome of many creative efforts can communicate the message of a specific photographic exhibit or a photograph of an exhibit. These kinds of communication with clear ideas and definite objectives are often felt necessary and are of immense value for approaching an assignment with ace professionalism to attain a desired mathematical precision.

Production of an effective exhibit and its fruitful way of display keeping visually vivid its thematic values necessitates very frequent and repeated interaction among the people of different disciplines involved in the process. In case of other productive media like painting, modelling etc. necessary interaction occurs with different phases of progress of work, desired modifications, alterations can be carried on in the course of accomplishment. The major advantage of all such media over photography lies in the feasibilities of visual assessment of progress inch to inch. Since the process involved in preparing a photographic exhibit is mainly to make the exposed light sensitive materials subject of a precise time and temperature-bound chemical process, its scope for visual verification is confined. The process in nature is continuous and once initiated, inevitably it has to reach the final step. This is the take off point to realise the importance and necessity for approaching the process in a more planned and predetermined manner with crystal clear foresight in regard to the final outcome and format. Thematic suitability should be ascertained with due consideration of varieties of relevant technical aspects. Museum photography is more than exposing films with a SLR Camera with built-in exposure control device. Hence it is necessary to be fully knowledgeable about the physical and chemical properties of the materials to be used, the scope of achievements and the bar of limitations. Thematic selection should get the due approval of all these considerations. Unlike other media any change of ideas in between in respect of thematic expression, composition, perspective, format, techniques decided for the final display will simply give way either to deterioration in quality of the production which eventually results in the repetition of the whole process which means wastage of money, raw materials, time and energy. Many enthusiastic creative efforts are either getting buried in mid way and ultimately find their place in the garbage only because of ever fluctuating decisions. This is one of the main reasons why most of the museum photographic laboratories of the country are merely attending to routine, traditional assignments inspite of the creative possibilities this medium possesses. The only way of getting rid of such hurdles is frequent discussion, interaction and proper dissemination of precise thoughts and ideas, among all concerned prior to practical involvement of the productions.

The light sensitive materials generally used in exhibit fabrication include panchromatic and orthochromatic transparent or semi-transparent base and graphic art materials. They are both of positive and negative type. Graphic art and diapositive are both orthochromatic, of transparent base identical and almost impossible to differentiate without going to the label on the package. Their developing agent and processing procedures are basically different. Diapositive film is used as positive material and because of less resolving power it is not meantfor making negatives though it is a continuous tone film and because of its orthochromatic nature it has some advantage over the panchromatic with regard to loading the large format film holders and processing. Graphic art (lith) is a very slow speed film and is used mainly for lining work and gives high contrast, with no gradation. In case of big enlargements it becomes difficult with these materials to hold the finest white lines as snow white in the middle of a whole black body unless exposure and developing are carried out with extraordinary precision. The process of mixing and storing of developers are also not alike with diapositive. Hence precise communication with definite objectives about their use is a necessity.

In spite of the ever increasing popularity of the miniatures large format photography cannot be replaced with miniatures at least in museums. Very good opportunities can be availed even without much effort to produce wizardry effects in large formal photography. But learning of its fundamental principles and creative possibilities to serve multipurpose needs of museum photography is required for creative planning. In most of the large format cameras movement of every part of camera is possible and with this advantage possibilities of creating multi-dimensional pleasant effects are wide open. Here again it is necessary to understand how movements of the different parts in the process controls among other things, perspectives, depth of field etc.

"Unfortunately in too many cases this knowledge is lacking and the owners of large format cameras are in fact carrying around with them an unopened treasure chest of technical aids to which they do not have the key. They might will be likened to the owner of a high powered car who has not yet learned to change gear and thus therefore, to drive always in the first"—Large Format Photography, Nikolaus Karpf, Grossbild-Tecknik, Gmbh Munich 70.

The second phase is display. Modern trend in the art of display is to use irregular shape of framework to make the whole presentation more appealing. Here what essentially is to be communicated cannot be done unless the photographer has a vivid idea about the exact shape and design of the show case where a particular translite, photograph, silk screen printing, text on graphic art will be displayed. A plain photograph is not sufficient to meet such requirements. A wide variety of manipulation is necessary. The treatments are totally different in every individual case. Hence it can be easily understood how invaluable it is of having such information well in advance.

The next phase is to install the exhibit in the specific space. This involves some careful work. Any communication gap at this stage can be the cause of total destruction.

The general practise is to keep some extra background instead of making it exactly to the size with a view to allowing some scope for adjustments at the time of final display. Occasionally an extended background area is kept only to accommodate the exhibit in the specifically designed unusual frame keeping clear the thematic expression. Now the important thing is to make the fullest use of these provisions which are just deliberately made. A plain photograph in the process of becoming a full fledged museum exhibit obviously has to go through different stages of final composition, trimming, mounting etc. before it is ready for final display. This necessitates proper supervision by knowledgeable persons on photographic composition. It is practically not feasible for a museum photographer to deal with these as he has to spend the vital hours of the day in the dark. The persons responsible for the final display and knowledgeable about photographic composition should take care of these stages.

I instantly remember one incident of relevance. I made once one oval shape blow up on diapositive sheets of about 1.2m in height. Towards the top pole some blank space of irregular shape was kept. With perfect dodging which needs good amount of efforts, greyish tone was produced in the blank area which was almost identical in grade to the background of the original picture. It was decided that the enclosure for this exhibit would be designed alike. Scientific information in the form text was to be super-imposed on the irregular shaped toppole area, giving the whole exhibit a sense of continuity. The print was taken away by some person responsible for display and was then left to a carpenter for a fine edge cutting without briefing him upon the necessity of that irregular blank space. And the carpenter at the very outset being annoyed with its very irregular shape did the rest. He gave it a fine over oval shaped cut. Many such incidents are happening and there are many more such stories to tell and still now can be heard at the completion of every gallery or a temporary exhibition. Sush incidents can be easily avoided with a little more sense of responsibility, care and consciousness.

Even in the case of field photography which should have specific objectives in a museum like the Natural history museum, many hurdles can be overcome evet at the time of snapping if format and design of the final display is known in advance. If a translite of tropical rain forest with certain foreground exhibits is designed for its eventual display horizontally and if this is communicated well in advance. the frame can be composed accordingy in the field and shaping a vartical composition into a horizontal during enlargement can thus be avoided. It is needless to say this kind of communication in advance prevents possible deterioration in the quality of final display. In museum photography it is not only the exhibits that speak of the message, age, composition, direction, angle of view, etc. but the positioning of the objects have also a lot of say. These factors are evident in photography for the purpose of publicity and publication.

Depth of focus plays a vital role in such communicating factors. The very elementary principle is that the more wide open the lens aperture is the less is the depth of field and vice versa. Three consecutive shots of the same spot of an exhibit gallery can stand for three totally different ideas—one with smallest aperture (not being very strict of the factor of critical aperture); second three steps down the 'f' number of the lens; and third with diaphragm full open. The first one will be a good general view of the exhibit gallery with everything in sharp focus the second one would be a good example of balancing the composition—the sharp focus foreground objects and semi focus background exhibits; the third one will hold only forground exhibits in sharp focus, rest of the background will be completely blurred—which is considered a good photograph of an individual exhibit. Each of these photographs has its own words to say and specific purpose to serve. The right one should be used for the right purpose. Arguments such as, the best one is that in which everything is in sharp focus or otherwise, come simply due to the lack of proper knowledge and understanding of how photographic composition communicates.

If a touch-and-feel exhibit is to be photographed, the elements besides the exhibit should contribute to the composition in such a way as to ensure that a viewer may look straight at the exhibit.

While photographing such exhibits it is expected that this will be done with all true details and the photographs will contain every grade and tone that human eyes can see. This expectation again leads to many discussions related to proper communication and dissemination of knowledge. For example the diorama is one of the main exhibits in the exhibition gallery of Natural History Museum. A creation of illusion of the reality of Natural is the sole purpose of a diorama. Three dimensional foreground objects are exhibited against a painted background in most of the cases which is curved. This creation of illusion of reality is to be photographed. While fabricating such exhibits, it is unfortunate that certain things often do not get proper attention causing it difficult for photographing such exhibits properly. For instance while creating a day light scene the factor which is considered very important for the purpose of photographing is the installation of the illumination units. Intensity of the illumination should be determined by the use of a photo-light-metre and shold be more or less identical to the intensity of the natural day light reading of a particular ecological spot. This measure will not simply help for photography but it will also improve upon the whole display. Three dimensional foreground objects should be illuminated in a such way that they do not cast any silhouette effects while viewing the front perspective. All the important details of the three dimensional foreground objects should be illuminated evenly. Lack of these display qualities are often felt acutely in many dioramas; for the camera eye records the whole image on one plane unlike human eyes. Another important factor that should be taken care of right at the initial stage of planning an exhibit gallery is the installation of electric switches for illumination units. Arrangement should be such that each of the exhibits, showcases, dioramas has its individual electric switches and they can be easily reached and identified. This is the only effective solution for avoiding glares and reflections. Besides, this system is also very convenient for maintenance and taking care of the exhibit showcases. Imbalance installation or insufficient illumination makes it difficult to make out a good negative. Only remedy lies in retouching the negative. Even this cannot fully restore the desired gradation.

Retouching the positive products is a usual post-printing phase and this is necessarily done by a photofinisher. Thus it is a chain right from the stage where the ideas are developed. Even if one of the links does not function properly as it should, the whole process goes waste.

For publication, a black and white photograph, a moderate contact print with good gradation and tone is desired. The modern computerized Xerox copier renders two tones only—black and white. For making multiple Xerox copies of a continuous tone photograph low contrast prints are suitable. Hence, it is obvious that persons working in the darkroom should be told well in advance of this so that they can do justice to such specific purpose suitably instead of delivering a simple print.

In every field technology is advancing at tremendous speed; so too is Photography. Latest models of cameras and accessories of today are utterly obsolete tomorrow. Even ace professionals find it difficult to keep up their knowledge up-to-date. It is not expected that people from other disciplines will be well versed in such matters. To add to this museum photography has its own direction of art and terms to dictate. Hence to bridge all the communication gaps properly and to reach a mutual decision proper dissemination of knowledge to all involved is necessary. This necessitates arrangements for internship training facilities. As ill luck would have it museum photograply is a neglected field. In spite of the ever growing consciousness of various aspects and needs of museums and museum profession museum photography has yet to earn the well deserved attention in the true sense at the appropriate level. Many things remain to be done, yet so little is done. Museology diploma courses conducted throughout the country at different universities may take care of it in a more wider manner. The Museums Association of India can do a great deal in this respect through their varius well-organised seminars, symposiums and workshops. The different well-established and reputed museums of the country can do a lot by providing refresher course training facilities to relevant persons absorbed in different categories of museum service.

Insect Pests of Museum Materials their Deleterious Effects and Methods of Control

IFTIKHAR ALAM

Since the majority of objects in any museum collection are organic in nature there is need to preserve and protect them from agencies which tend to destroy them. These destructive agencies include bacteria, micro-fungi, mould, insects, rodents and even the careless curators. The most harmful, of all the above mentioned agencies of bio-deterioration, are insects and therefore, museologists and entomologists have always been engaged in evolving methods for the control of these foes which injure objects consisting of cellulose as well as proteinous materials. Cellulose containing objects include materials which are derived from plants, wood products, paper, cotton, herbarium collections and collections of other plant products. Proteinous objects include skin and hides, stuffed animals, leather, parchment, wool, fur, feather, ivory, bone and dried entomological specimens. Insect pests of cellulose material may be further divided into pests of wood and wooden objects and pests of textiles, paper and other archival materials.

(*A*) *Pests of wood and wooden structures:* When we think of wood and the pests related with it we are bound to think of white ants, for perhaps, no other insect has infested museum objects so frequently and severaly as these. There are about 2000 species of termites and of these nearly sixty nine are considered by Harris and Snyder (Ebling-68) as serious pests of buildings. These species are found among the following six families of the order Isoptera:-

Rhinotermitidae	33
Termitidae	18
Kalotermitidae	12
Mastotermitidae	1
Termopsidae	2
Hodotermitidea	3

Edward and Bell (1981) in their status report of pest control in museums have included eight species of termites belonging to the families of Hodotermitidae (one species), Kalotermitidae (six species) and Rhinotermitidae (one species) which are found causing damage to museum materials.

In India about 15 species have been described as the pests of building materials (Bhowmik 1968).

In 1970, Nair, working on the problem of biodeterioration of museum objects, surveyed museum collections at different museum centres in India and recorded the following seven species:-

Odontotermes macrodentatus, *Heterotermes indicola*,
Microtermes obesi, *Hodotermes macrophagus*,
Leucotermes indicola, *Termes brunneus*, *Eremotermes Sps.*

Bhowmik (1968) and Agrawal (1979) have also written on the subject and their publications are of considerable importance to people engaged in the curatorial profession. This paper is concerned with the wood destroying insects other than termites.

A large number of wooden objects are usually present in the collections of ethnographical, anthropological and cultural importance such as furniture, musical instruments, utensils, implements, tools, weapons, carvings, decoration pieces and other household objects. In addition to these wooden frames, show cases, pedestals and partitions are also used for the display of museum objects. All the above articles and structures were found to be infested with different species of insect pests, which usually belonged to the families, Anobidae, Bostrichidae, Cerembycidae and Lyctidae.

1. *Family Anobidae:* This family includes wood worms and furniture beetles, of which *Anobium punctatum* is the most common pest. As reported by Hickin (1971) it lays whitish eggs which are spherical in shape. The lower part of the eggs has honeycomb like patterns of small pits in which microscopic yeast like organisms are transferred from the oviduct of the female. The larvae hatch out after two to three weeks eating their way out through the bottom's pitted half of the eggs shells. In this way they ingest yeast like cells which came to play an important part in the breaking down of cellulose.

Soon after hatching, the young larva bores its way into the wood and lives there. Spiller (1963), as reported by Hickin (1971), observed either no hatching or impaired hatching at a relative humidity below sixty percent.

The eggs are always laid in the cracks, cervices and holes present on the surface of the wood and the larvae are admirably suited for the life in wood. Parkin (1933) has described eight anobid larvae and prepared a key for the identification of the larvae of different species. The adults emerge from pupal cells, just below the surface of the wood (Ebeling 1978). They meet soon after their emergence and a day later the females deposit eggs. The average number of eggs laid by each female has been reported to be 18 to 28 by Hickin (1973).

Spiller (1963) observed that in general the reproductive life of the females lasts for about 15 days though the females live a few days after emergence. In this way the adult longevity was found to be 24-31 days.

The larvae require about a year for completing the development out doors. They pupate for two to three weeks in a cell just below the surface of the wood. The life cycle is completed in 2 to 3 years under laboratory conditions.

The species *Anobium punctatum* is confined to the temperate regions and is especially destructive in Europe. In U.S.A. it is fairly common in the east but not along the Pacific coast where infestation is generally restricted to imported furniture. Toskina (1978) reported that the pest is widely spread in the U.S.S.R. In fact the wide distribution is possible on account of the infested furniture being carried to all the continents.

Another important species attacking wood is *Anobium straiatum* which completes its life cycle in one to three years. The larvae measuring 3-7mm in length are brown in colour and the elytra occasionally show markings (Deschiens 1957). Another anobid *Gastrallus sauteri*, as reported by Mori (1978) is common in Japan and causes great harm to the documents and old books made up of Japanese paper. It can also bore through the cases made up of Paulownia wood. Mori (1978) also reported *Gastrallus immarginatus* as destroying the wooden buildings, old documents, books and cases of Paulownia wood. *Priobium carpini*, *Priobium confusum* and *Priobium pertinex* have been reported by Toskina (1978) as being injurious to unheated structures in northern regions of the European part of the U.S.S.R.

Ebeling (1978) reported that *Priobium carpini* becomes active at dusk when oviposition occurs. The egg shell is thorny so that the eggs can be adhered to smooth surfaces. Embryonic period lasts from two to three weeks at a relative humidity of less than 70%.

The grubs devour some of the eggs shell. They exhibit negative phototaxis. The larval period lasts for several years. The species attack both soft and hard wood. Contrary to this *Priobium confusum* attacks only soft wood and prefers areas with greater current of air and consequently a lesser degree of humidity. *Priobium pertinex* also prefers to settle in soft wood. Nair (1970) has recorded *Gastrallus indicus* from archival materials and books in different libraries in India. Bhowmik (1968) reported that painted panels are often attacked by the Anobium species and if remedial action is not taken in time, the support of the paintings gets weakened resulting in cleavage on the painted surface.

Xestobium rufovillosum, the famous death-watch beetle has been described by Deschiens (1957) as the biggest of all the insect enemies of wooden works of art. Measuring 7x4 mm. in size, it shows particular preference for rotten wood which owing to previous exposure to moisture becomes infested with dry rot.

2. *Family Bostrichidae:* (False Powder Post Beetles) The bostrichidae include small to large size beetles. In most of the species the head is deflexed and not visible from above, being hidden from view beneath a large thorax giving the impression of its being humped back.

In bostrichids the adult beetles bore into the wood and prepare "egg tunnels" for the deposition of eggs. This is in contrast to anobids and lyctides which oviposit in surface cracks. Some of the important species attacking museum materials are:-

Dinoderus minutus is a cylindrical brown beetles, 3 to 4 mm. in length. It is cosmopolitan in distribution and is particularly destructive to objects made of bamboo in Japan (Mori, 1978). In India *D. minutus* is widely distributed and causes much damage to bamboo made objects present in the museum collections.

Heterobostrychus aequalis: This is 6 to 13mm. long species and is reddish brown to brownish black in colour. It is probably the most common species of large bostrichids found in India. It has been found boring packing cases, plywood and other articles of wooden furniture. If the infestation is serious the wood is reduced to powder.

Two other beetles, *Sinoxylore crassum* and *S. anale* also cause considerable damage to museum materials.

3. *Family Cerambycidae:* This family includes about 20,000 species of long horned or round headed beetles which are wood boring in nature (Ebeling, 1978). The majority of these beetles attack the living trees. A number of them can however, complete their development in timber, which is obtained from infested trees. In this way they can be regarded as of secondary importance to a museologist. Some of the species which have been regarded as potential museum pests include *Hylotrupes bajulus* which despite its being a major pest of soft wood, has not been rated as an important pest of musum objects (Hickin, 1971). Deschiens (1957) has recorded *H. bajulus* as attacking old carvings. No record is, however, available regarding its presence in Indian museums. *Palaeocallidium rufipenne* was recorded by Arai (1980) in some storage rooms in Japan. The species is known to attack wood which is used for constructing the walls of the storage spaces. *Storomatium barbatum* causes damage to Dilbergia wood in India, *Hoplocerambyx spinicornis* and *Chlorophorus annularis* causes considerable damage to bamboo and wood of *S. robusta*.

4. *Family Lyctidae:* This family includes powder post beetles. They are small beetles ranging from 2 to 7mm. in length and are cosmopolitan in distribution. According to Ebeling (1978) there are 66 known species of Lyctids which are second only to termites in their destructiveness to wooden objects and wood products. Descheins (1957) has recorded 150 species belonging to the family lyctidae which may be included in such a list of museum pests. *Lyctus brunneus* is a cosmopolitan species and measures 3 to 6 mm in size. Ebeling (1978) described it is a slender brown beetle with black head and prothorax. Mori (1978) observed them as being extensively damaging to the interior decorations and flooring in Japan. While Arai (1980) has found the species attacking show-cases made of lauan wood. Mori (1978) has also recorded this species from bamboo and bamboo materials.

Lyctus linearis has been recorded as another important species which attacks cultural property (Deschiens, 1957). *Lyctoxylon japonum* is a bamboo pest in Japan (Mori, 1978) whereas *Lyctus africannus* is responsible for a large number of infestations of wooden objects found in museums in India.

(B) *Textile Pests:* Insects belonging to different groups cause irrepairable damage to textiles in museum collections. As quoted by Hueck (1972) Laiback analysed seven hundred cases of textile damages occurring in West Germany in 1956-58 and 1961-63. He recorded over 50 species, most of which had occured only once. The following list shows the number of infestations which occurred (in percentage) by the more important pest species:-

Tineola bisselliella (common clothes moth)	25%
Hofmannophila pseudospretella (Borwn house moth)	9%
All clothes moths and house moths together	38%
Anthrenus verbasci (varied carpet beetle)	18%
Attagenus pellio	14%
All carpet beetles together	38%
Lepisma saccharina (Silver fish)	2%
Niptus hololeucus (golden spider beetle)	9%
Cockroaches	1%
Wood-boring beetles	2%

As observed by Moore (1978) fabric damaging pests sometimes move into the museums from abandoned nests of birds, rodents, bees, wasps and from carcasses of dead animals. These pests generally belong to the families Tinidae, Dermestidae and Lepismatidae.

As reported by the British Museum of Natural History, there are six species of moths whose larvae may damage woolen and other fabrics. These are *Tineola bisselliella*, *Tinea pellionella*, *Tinea pallescentella*, *Trichophaga tapezella*, *Hofmannophila pseudospretella* and *Endrosis sareitrella*.

The life cycle of the case-making clothes moth, *Tinea pellionella* has been studied by a number of workers. Mating, in this species, occurs soon after the moths emerge from the pupae. Each female lays 40-70 eggs over a period of about 24 days. The time taken for the eggs to hatch out varies greatly according to the temperature. At 24°C-27°C, the eggs hatch in 7 days but at 13°C the average period of hatching is 37 days. The larvae often construct protective tubes or cases made of silk that is secreted from their bodies and partly from the fibres of the food materials. The length of larval life varies greatly and depends on the temperature and humidity as well as on the nature of the food.

The larval stage generally lasts from two to three months, though in suitable conditions the duration may be extended to as long as four years. The fully grown larva pupates in a tough cocoon. The length of the pupal stage varies according to temperature and ranges from 11 days to 54 days.

Most of the textile infestation cases recorded by Nair (1970) from Indian museums, were due to the presence of *Tinea pellionella*. The present author collected species of the genus, *Tinea fictrix* from pegion nests at Aligarh.

Observations on the feeding habits of the larvae revealed that the species cannot become a serious pest to the museum materials.

Dermestids feed on a wide variety of materials of both animal and vegetable origin. Larval stage is mainly responsible for the destruction that is caused to fabric. They primarily feed on textiles of animal origin such as wool, silk, fur and felt. The species usually found infesting textile collections are *Anthrenus museorum*, *Anthrenus verbasci*, *Anthrenus scrophulariae*, *Anthrenus vorax*, *Anthrenoceros australis*, *Attaqenus piceus* and *Attaqenus pellio* (Hueck, 1972).

In 1953 Wall reported that Viscose rayon was particularly attractive to the *Ctenolepasma quraduiseriata* and *Thermobia domestica*. These insects did not show any preference for materials made of cellulose acetate and also accept wool as a second choice of food.

(C) *Pests of Archival Materials:* It is a common belief that the silver fish is the most common pest of paper and other archival materials. Arai (1975) made an extensive survey of some important libaries in Japan and concluded that books are mainly deteriorated by the larvae of Anobiidae. His investigations have revealed that larvae of *Gastrallus immarginatus*, *Stegobium paniceum*, *Nicobium castaneum*, *Anthrenus sps*., *Troquim pularatorium*, *Menomorium nipponense*, and *Monomorium triviale* were mainly responsible for the major part of the destruction caused to books. Hoffman (1933) reported a heavy infestation of *Rhyzopertha dominicana* (Bostrichidae) in the cases of books that were kept in a library.

Of course, the problem of damage caused by different species of silver fish to the documents, manuscripts, miniature paintings and other archival materials cannot be over emphasised. The best known of all species is the shiny silvery grey common silver fish, *Lepisma saccharina*, 8 to 13mm. in length. The studies conducted by Sweetman (1939) on the feeding response of *Lepisma saccharina* clearly showed that these insects feed on a number of foods rich in protein, rather than in carbohydrates. This explains the heavy damage caused by the pest to leather book-bindings.

Ivany (1968) found the following species of Thysanura in different museums and libraries in Hawaii, Ceylon, Pureto Rico, UAR and Hong Kong:-

Ctenolepisma longicaudata Acrotelsa collaris, *Ctenoleposma urbana*, *Ctenolepisma reducta*, *Ctenoleposma nigrum*, *Pieloleposma calvum*, *Thermobia aeqyptiaca*.

Silver fishes not only cause damage to the surface of paper, book-bindings, paste board boxes but they also eat the glue and even Indian ink of the labels of the collections on display. They damage photographic prints, paper linings of walls and sometimes feed on dry plant specimens in herbarium. Ivany (1968) found *Ctenolepisma longicaudata* feeding on dried specimens of Echinodermata. He also reported that in Puerto Rico *Ctenolepisma reducta* was found infesting envelopes containing the scale insects.

The present author also recorded silver fish from the University library and the museum at Aligarh and the specimens collected belonged to *Lepisma saccharina*.

The other pests of archival materials of secondary importance are book-lice (Psociptera) and Cockroaches (Blattidae). The common species of book-lice belong to the genus Liposcelis. They feed on mould growing on paper and in the process damage paper. The orient cockroaches (*Blatta orientalis*) have also been found causing damage to archival materials in libraries and museums.

(D) *Pest of Dry Mounted Biological Specimens:* A number of beetles belonging to family Dermestidae also attack museum specimens of animal origin. These specimens include dried entomological collection., hides and skins of birds, mammals and reptiles, ivory, bone, leather, parchment and herbarium collections. In some cases the damage is so severe that the specimens fall to pieces within a short period of time.

Anthrenus spp. and *Attaqenus spp*. are by far the most important pests of dried biological specimens. The present author collected larvae of *Anthrenus verbasci* from one of the mounted bird skin displayed in a museum at Aligarh. This species also causes serious damage to the dried insect collections. Guha (1970) has observed Dermestids infesting animal skins, hair and feathers in ethnographical collections. Many instances of *Attagenus spp*. infesting museum specimens, particularly the dried insects in N. America and Japan, are on record.

As regards botanical collections, *Steqobium paniceum* has been known to cause serious damage to herbarium collections. Mutchler (1937) recorded *Anthrenus verbasci* infesting seeds in a museum in North America.

The larvae of *Anobium punctatum* have been recorded from herbarium collections in India. Nair (1970) found that the Khapra beetle, *Trcqoderma granarium* feed on wheat, whereas the larvae of *Tribolium confusum* and *Tribolium castaneum* destroys rice. *Lasioderma serricorae* was also found to feed on seeds, cereal products and dried fruits. Nair (1970) has also reported that the carpet beetle, *Attagenus gloriosae* attacks stored paddy seeds and rice.

(E) *Control of Museum Pests:* Recent advances in our understanding of the chemistry of insecticides have resulted in the development of effective means to protect museum collections against the ravages of insect pests.

The control of museum pests is, however, a specialized job and out of a very wide range of available insecticides only a limited number can be recommended for use in museums. Thus toxicants which may be used for such purposes should be non-staining and should not in any way alter the original texture of the specimens and antiquities. Such chemicals have to be harmless to human beings but lethal to insects, even in a low dosage.

1. *Precautionary measures:* include the maintenance of suitable relative humidity and temperature, cleanliness and ventilation. They further include proper 'quarantine' treatment of the new additions to museum collections and periodic checking and examination of the objects to detect any sign of insect infestation.

Of the various ecological factors, humidity, temperature and food, are the three main causes which greatly influence the population density of pests in a museum. As the rate of hatching of eggs and growth, in pre-adult stages, is affected by changes in moisture and temperature conditions, it is necessary that optimum conditions, from the point of view of conservation, of temperature and relative humidity, should be maintained in the museum building.

Maintenance of proper sanitation, in the museum building, is another necessary condition. Since most of the museums run canteens for the staff and the visitors, there is every possibility of increased pestilence in spilled food and other organic matter. The insects breed and multiply under such conditions as sufficient food is available to them.

Some workers also suggest complete removal of spider webs and bird nests from in and around the museum building to minimise the chances of pest infestation (Moore, 1978).

In order to prevent the infestation of museum stock by pests, Vetter (1978) suggested that all items brought into museum, whether from expedition, new purchases, or travelling exhibitions must be fumigated before being preserved and for this purpose fumigation chambers should be installed at places where objects are unloaded from transport vehicles and brought to the museum.

It is also necessary that the objects in a museum should be isolated as far as possible from the surrounding environment by means of physical or chemical barriers or a combination of both. If an object is kept in a hermetically sealed plastic bag or in an air-tight drawer it is physically isolated from its surroundings. But if these closed spaces are constantly fumigated with fumigants like naphthalene or paradichlorobenzene the object will remain chemically protected from the attack of the pests.

2. *Chemical treatment of wooden objects:* Infestation of wood boring beetles, particularly the powder post beetles, can be controlled if the object is treated with pentachloro-phenol. The only disadvantage of the toxicant is that it may affect the finish on many wooden surfaces and cannot be used indiscriminately.

As reported by Bhowmik (1968), wood boring beetles can also be controlled by spraying the article with a solution of mercuric chloride in petroleum or ethanol. The use of 20% solution of equal parts of naphthalene flakes and paradichlore benzene in carbon tetrachloride has also been recommended by the author. As carbon tetrachloride is a very strong organic solvent it cannot be recommended for painted wooden objects as it is likely to obliterate the painted surfaces. Bhowmik (1968) has also recommended that wooden materials in museums, can be protected from insect attack by spraying them with a formulation containing cresote (50cc.), mercuric chloride (10 gms.), 2.0% pyrethrum extract (15cc.) and 500cc. petroleum spirit. The above solution can be mixed with water in desired proportions before use.

The insecticides that have proved effective for the control of wood boring insects, particularly, the powder post beetles (Lyctiids) are 5% toxaphene, 2% chlordane, 0.5% Dieldrin and 0.5% Lindane. Immersion for 15 minutes gives protection for atleast three years. A five minute dip in 5.0% pentachloro-phenol, in a light fuel-oil base, has also been found to be highly useful (Ebeling, 1978).

Boustead (1968) found that 5% solution of Pentachloro phenol in naphta or kerosene is an excellent insecticide for the control of lyctus beetles. He also suggested the use of the following formulation which was found to be highly effective against all stages of wood boring insects. This could be due to its rapid penetration into the wood.

One pint of dichloroethyl ether, 2.5 fluid ounces of chlordane or 4 fluid ounces of Dieldrin and 5 pints of lighting kerosene.

Hickin (1971) has also recommended the use of Dieldrin, DDT or Lindane by brush or by spray for the control of *Anobium punctatum* and *Xestobium rufovillosum.* Moore (1978) has recommended the use of pentachlorophenol for powder post beetles control.

According to the insecticidal tests conducted by Toskina (1978) a 10% solution of sodium pentachlorophenoxide (SPCPH) is the most reliable material for the control of Anobids. It may, however, be pointed out that Toskina's work was conducted to control the insects in uninhabited wooden structures. As SPCPH is toxic to warm blooded animals, it should be used with the utmost caution and should not be applied on painted wooden surfaces as the toxicant may obliterate them.

Spraying with the following formulation can also provide effective control of *Anobium punctatum* (Ivany, 1968):

Dichloroethyl Ether	..	500 cm.^{3}
Chlordane	..	80 cm.^{3}
Dieldrin	..	125 cm.^{3}
DDT	..	160 cm.^{3}
Kerosene	..	2.5 lits.

The above mentioned chemical formulations are used for controlling the pests when the infestation is of low intensity and is not wide spread. In case of acute and wide spread infestations the only treatment recommended by almost all the workers is fumigation.

3. *Control of textile pests:* Insects belonging to different groups cause irrepairable damage to textiles in the museum collections. The most common among textile pests are clothes moths and the dermestids.

Burgers (1945) conducted experiments to test the insect proofing properties of aluminium acetate, sodium silico flouride, Flit, Preventol, Trichloro ethane, Sulphur, Cyanide and Eulan N.K. and Eulan W. He came to the conclusion that Eulan N.K. and W. gave good protection to woollens against keratin consuming moths and dermestid beetles.

Block (undated) tried sixty-eight chemicals and concluded that only mercuric chloride and the water soluble thiocyanates had repellent properties and afforded almost complete protection when applied in 5% alcohol solution. Parkin (undated) recommends the use of liquid preparation containing Dieldrin, chlordane and also a mixture of DDT pyrethrum. Guha (1970) suggested that wool and other materials of animal origin should be sprayed with a solution of 2% chlordane, 0.5% lindane or 5% DDT, once or twice a year as a precautionary measure against dermestid infestation.

Bry's (1980) extensive work against fabric pests is based on the use of Pyrethrins, Permethrin and Smithrin. Because of low mammalian toxicity and the effectiveness of the combination, he recommended the use of pyrethrum and piperoyl butoxide for the control of pests of woollen garments especially the larvae of black carpet beetles and the webbing clothes moth.

In 1981 Bry published his results regarding the effectiveness of Smithrin spray against fabric pests and concluded that a solvent-based pressurized formulation of Smithrin was effective in protecting woollen cloths against feeding damage caused by the larvae of *Attagenus megatoma*, *Anthrenus flavipes*, and *Tineola bisselliella*. Its use was recommended by him as it did not stain the fabric or emitted any objectionable odour.

In connection with the chemical control of textile pests Hueck (1972) has made an extensive survey of the effectiveness of different insecticides and found that the following chemicals cuold be effectively used for the control of textile pests.

Name	LD$_{50}$ (Oral)	Remarks
(A) *Insecticides for pronounced residual activity:*		
DDT	100	These chemicals are used as solutions.
Methoxychlor	6000	
Lindane	125	
Chlordane	460	
Dieldrin	60	
Endosulfan	110	
Diazinon	100-150	
(B) *General purpose insecticides:*		
Pyrethrins	820	
Lethane 384	90	
Malathion	1400	
Sevin	500-700	
Thamite	1600	
(C) *Fumigants:*		
DDVP	56-80	
P. Dichlorobenzene	2950	
Ethylene Oxide	330	

In this table LD_{50} is calculated as the dose in terms of mg/Kg. body weight which is lethal for 50% of the experimental animals. Most of the toxicants included in group 'A' are used as solutions. The proper use of these insecticides is in the spraying of floors, walls and ceilings. Generally an amount of 1 gm. of the active compound per sq. m. of the wall area is used. DDT provides a long-lasting protection but its indiscriminate use cannot be recommended. Hueck (1972) is not against direct spraying of DDT, Lindane or Dieldrin on textiles if used with restraint. Para dichlorobenzene and DDVP (Dichlorves) are applied in gaseous forms. DDVP is more effective than para dichlorobenzene. DDVP is useful as its high toxicity makes its use easier and does not call for treating the objects in hermetically closed containers as is the case with the use of para dichlorobenzene. The high toxcity of DDVP restricts its use to areas not generally open to the public.

In case of severe infections, it is necessary to use insecticides belonging to group 'B' while using these chemicals, the treatment should be thorough and care should be taken to track down, if possible, the sources of infestation.

Sometimes, in severe outbreaks of pests, it becomes necessary to treat the objects with fumigants. Hueck (1972) is, however, of the opinion that with the present high efficiency of contact insecticides the use of fumigants is hardly necessary.

Paper impregnated with lindane, DDVP, are commercially available and may be useful if piles of textiles are to be protected. They should be inserted between individual pieces of fabric and be renewed after six to nine months.

Bhowmik (1968) has suggested the use of a formulation containing Naphthalene (100 gms.), Sodium pentachlorophenate (30 gms.), Pyrethrum extract 2% (200 cc.) and Ethyl alcohol (100 cc.) for preventing insects from attacking textiles. Water dilutions of the product can be directly applied on the textiles and provide satisfactory protection of textiles from insect attacks.

(4) *Chemical control of insect pests of archival materials:*

As suggested by Bhowmik (1968) pyrethrum and lethan sprays can be used to render book materials distasteful to all the common book pests. Most of the insecticides already discussed, in case of textiles, can be used for the protection of archival materials. Kathpalia (1973) has suggested that most of the archival pests are vulnerable to one or more of the many powerful insecticides, such as Dieldrin (20% solution per gallon of water), oil solution of 5% DDT, 2% chlordane, 2% malathion or 1% lindane. He also recommended that the shelves may be brushed or sprayed with insecticidal lacquers. Lacquers which have proved effective contain either Dieldrin or chloro-naphthalene as their active ingredients.

Kozulina (1978) studied in detail the effect of DDT, Lindane and the paste of TSNIDI (a formulation prepared by TSNID Institute) on some leather beetles such as *Dermestesl ardasius*, *Attaqenus picans*, *Anthrenus sp.* and *Steqobium paniceum*.

Silverfish and firebrats can easily be controlled by liquid sprays containing malathion (Slater, 1977). Silica-gel based dust, and boric powder are some of the other preparations which can be used. It is recommended that packets be placed in closets, under rugs, in book cases and in other places where silver fish hide. Silica-gal based dust and boric acid powder is applied with a bulk duster, power blower, or with plastic squeeze bottles.

These materials may be puffed directly to doors and window frames, closets, book cases and places where electrical wires and pipes go through walls. Special care should be taken to .locate cracks and crevices. If the operations are carried out carefully an effective control can be obtained within two to three weeks.

(5) *Protection of herbarium specimens against insect pests:*

In general the concentrations of chemical toxicants used for the protection of dried plant collections against insect attack, should be non toxic to human beings and should be harmless to the preserved plant specimens.

The best method for the protection of herbarium collection is the use of repellents like naphthalene para-dichlorobenzene and dichlorvos. Stern (1968) found a dichlorvos concentration of Ca/.01 mg/litre fatal to the entire population of *Tineola bisselliella* larvae and *Blattela germanica* male adults in six and three days respectively and of *Aedes atropalpus* adults in a 30-minute exposure. However, only 19% kill of *Attagenus meqatoma* larvae occurred in 7 days with a similar concentration. Secondly, dichlorovos vapour concentration of Ca 0.1 mg/litre which is safe for human beings does not give a desirable kill (100%) of field flies.

Keeping these results in mind, Stern (1968) concluded, that where it is possible, the use of lindane should be preferred over dichlorvos for protecting the herbarium material from insect pests.

(6) *Insecticidal treatment for dry mounted Zoological specimens:*

Zoological specimens, particularly mammalian and bird skins, mounted by taxidermists and dried entomological collections are liable to be attacked by insect pests if these are not properly treated with chemical toxicants.

Usually, taxidermists apply toxicants during the mounting process of the skins. In this regard the use of a mixture of equal parts of Borax and Boric acid has been found to be quite safe from the point of view of the preparator and for protecting skins against insect attacks. Another preparation which is commonly used for this purpose is arsenic soap containing white arsenic and zinc oxide.

Mounted animals and birds, when attacked by dermestids, can effectively be protected by spraying a 15% solution of mercuric chloride in alcohol (Bhowmik, 1968).

The varied carpet beetle, *Anthrenus sp.* and larvae (the woolly bears) are responsible for large scale damage to fur, feathers and dried insect collections. Acute infestations can be controlled by spraying a liquid preparation containing Dieldrin and chlordane or a mixture of DDT and Pyrethrum (Parkin, undated).

Dried insect collections are among the most vulnerable museum materials as far as pest infestation is concerned. Dermestid beetles have taken a heavy toll of such collections in many of our museums. The larvae of *Anthrenus flavipes* are among the most injurious insects to museum collections of dried proteinous materials such as hair, feather and mounted specimens.

Nair (1970) also found the Khapra beetle *Trogoderma granarium* destroying dried insect collection in the Baroda Museum. The last way of controlling these beetles is to fumigate the infested objects.

As mentioned by Bhowmik (1968) a mixture containing one part of chloroform and creosote and six parts of naphthalene when coated over the storage boxes renders them insect proof.

Naphthalene or para dichlorobenzene flakes are commonly kept in wooden boxes containing dried insect specimens. If the boxes are made air tight, these chemicals provide protection to the specimens from all sort of insect pests. Some workers prefer the use of vapona strips over paradichlorobenzene and naphthalene because this is not only cheaper but has also a longer residual effect. They have successfully used (2 by 6cms.) vapona stripe for each wooden Schmidt box containing dried entomological collections. Such strips may be replaced once a year.

Guha (1970) from his experiments inferred that creosote is an effective repellent chemical which provides protection to all kinds of skin products against carpet beetles. He suggested direct application of 10.0% refined creosote solution on skin products.

A very safe method for protecting zoological specimens from insect attack is the 'Eulan treatment' developed by Bayer chemists. The Eulan treated keratin material becomes indigestable to the insects. As suggested by Rau (1968) Eulan is neither poisonous nor perishable. It combines with keratin in the feathers, hairs or horns and then the treated specimens can be subjected to any subsequent treatment without any ill effects. The Eulan treatment has no effect on the colour, fluffiness or flexibility of the treated material. Eulan treated specimens become insect proof without endangering the skinner or the scientist who subsequently works with them.

Another solution to the problem of 'mothproofing' is an aromatic sulphonamide derivate. This is extensively being used in the textile industry in Germany. However, as found by Funk (1975) the sulphonamide derivative has a great affinity for all proteins and nylon fibers and links up readily with the proteinous constituents of the animal material and provide full protection against the larvae of moths, carpet beetles and dermestids. The commercial preparation of sulphonamide derivate known as 'Edolan U' does not kill or repel insects but makes the material undesirable for consumption. According to Funk (1975) when used with care, Edolan U seems to be reasonably safe and provides a very adequate and thorough method of mothproofing.

(7) *Fumigation:* Fumigants are substances which liberate fumes which are lethal to insects in all stages of their life cycle. It is perhaps the most popular method of controlling insect pests in museum collections and ensures 100.0% instant control of a wide range of pests found in museums. The fumigation treatment can be given to either individual objects or to a group of objects or in severe cases of infestation to the museum building as a whole.

Fumigation can be effective only if the objects are treated in a closed space. Moreover, if the pressure of the fumes is higher, the penetration of the fumes through the objects (which are being fumigated) would be more and this would provide better protection to them. To achieve this goal fumigation is carried out in specially designed vacuum chambers. The success of a fumigation treatment depends upon the selection of the right type of fumigant for eradicating specific pests. A number of fumigants may be used for the eradication of different types of insect pests. The available information may be tabulated as follows:

Type of infestation	Fumigant recommended	Reference
For the control of insect pests.	Etox (90% Ethylene oxide+10% carbon dioxide). 1500-2000/m³ Reaction time 2 to 6 hrs.	Vetter (1978)
For fighting animal pests.	1. Hydrogen cyanide 20 g/m³ 2. Methyl bromide, 50 g/m³ 3. Ethylene oxide.	Vetter (1978)
For the control of insect pests and mould growth.	Etoxiate (a mixture of 45% ethylene oxide, 45% methyl formate and 10% carbon dioxide), 1500-2000g/m3 Reaction time 2-6 hours.	Vetter (1978)
For the supression of pests of archival material.	Ethoxide gas (mixture of 10% ethyl oxide and 90% carbon dioxide by weight). 400 g/m³ Reaction time 3 hours.	Kathpallia (1973)
For disinfection of archival material	Ethylene dichloride 3 parts carbon tetrachloride 1 part by volume. Half a litre's mixture for 2 m³ chamber.	Kathpallia (1973)
Controlling the infestation of archival material.	Formaldehyde, 250 g/m³ Reaction time 24-48 hours.	Kathpallia (1973)

Type of infestation	Fumigant recommended	Reference
Killing insects and larvae in archival material.	Paradichlorobenzene, for every cubic meter of air space 1 kg. of the chemical will be required. Reaction time atleast 2 weeks.	Kathpallia (1973)
Controlling borers in the wooden structure.	1. Methyl bromide, 35-$50 g/m^3$ at 20-30°c. Reaction time 24 hours. 2. Mixture of methyl bromide and ethylene oxide, (87: 13 by weight).	Mori (1978)
Control of wood borers.	Methyl bromide 50 parts per million for 8 hours.	Anonymous (1968)
Control of Herbarium pests.	Methyl bromide, 20cc. ampoul in cu. ft. Reaction time 2-3 hours.	Frariks (1965)
Control of fungi & bacteria.	Ethylene oxide.	Smithsonian Institution
Insect pests of animal material.	Methyl bromide.	Pest infestation control laboratory Berke.
Controlling the pest of Ethnographic and natural history specimens.	(A) Hydrogen cyanide (B) Carbon disulphide (C) Para-dichlorobenzene. (D) Para-dichlorobenzene.	Agrawal (1977)

A critical analysis shows that methyl bromide is the most reliable fumigant which can be used for the control of wide range of museum pests. It is superior to many other fumigants and is effective against the eggs, larvae, pupae and adults of insect pests whereas most other fumigants are toxic to larvae and adults only. In addition methyl bromide is non-inflammable and non-explosive and it does not produce any stain. It is economical to use and does not leave toxic residues. The fumigant has a high degree of penetration and leaves no residual odour. It can be easily applied and can be stored in steel cylinders for an indefinite period. Its boiling point is low which permits rapid vaporization and therefore, such fumigation can successfully be carried out in a chamber, plastic tent or sealed box at normal atmospheric pressure. It may, however, be added that all fumigants are toxic to man and methyl bromide is no exception. It is odourless and therefore, it is necessary to always use a leak detector when methyl bromide gas is used for fumigation purposes.

Caution: Recently Edith Stauley, published his recommendations (see Edward 1981) in which he has suggested that Methyl Bromide is especially valuable for controlling wood pests. But he has warned that Methyl Bromide should not be used with proteins or any other materials containing sulfur. This practically reduces the scope of the use of this fumigant for controlling wood pests only.

(8) *Other Methods of control :* Besides the use of chemicals and fumigants some other devices have also been tried by different workers for the control of pest infestation in museums.

Moore (1978) has suggested that lyctids and other wood boring pests can be killed by placing the object in a freezer for about 24 hours. This could be the reason why Clerk (1979) has advised that skins should be stored at temperature as low as 4°C.

Toskina (1978) reported that *Anobium punctatum* is unable to withstand high temperatures. At 30°C egg laying ceases. Although, embryonic development continues in the eggs the larvae can hardly emerge and do not bore into the wood. At 34°C the embryo is destroyed. It is also recorded in literature (Spiller-1948) quoted by Toskina (1978) that air humidity of 45% is critical and anobids die out in dry premises. Parfentiev (1947) has also been mentioned to report that 80-100% of larvae are destroyed at a sudden drop of temperature to 16 or 17°c in 48 hours. Thus as suggested by Gradidge (1967) heat can be used to kill museum pests.

Studies on the control of webbing clothes moth larvae by para-dischlorobenzene (Batth 1971) reveals that higher temperatures greatly reduce the exposure time required to effect 89-100% mortality of the clothes moth larvae as a 4-day exposure is required at 32.2°c while 15 days exposure is necessary to achieve the same percentage of mortality at a temperature of 15.5°c.

Short radio waves have also been tried by some researchers to kill the well-hidden wood worms in museum objects. Santucci (1961) has mentioned the work of Sayre who tried gamma rays from a cobalt source to kill the pests. Plenderleith has successfully used radio active waste for controlling death-watch beetles. Although details of the results obtained by these researchers are not available to the present author these experiments are suggestive of a vast field of immense potential especially when we are aware of the use of radio isotopes (like cobalt 60, phosphorus 32, and carbon 14) in agriculture for sterilizing insect pests. The use of phermones and insect juvenile hormone analogs could provide another very effective weapon to museum curators provided researches are museum oriented.

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Vikram A. Sarabhai Community Science Centre—Science Museum Activities

C.J. SANCHORAWALA

Introduction

Smt. Indira Gandhi, our Late Prime Minister had deep interest in application of Science and Technology for improving the standard of living of the common man in our country. Right from the inception of Community Science Centre, Smt. Gandhi took deep personal interest in the development of activities. Later after passing away of Dr. Vikram A. Sarabhai she formally inaugurated the Centre and dedicated it as Vikram A. Sarabhai Community Science Centre on 30.10.1973.

The foundation stone of the Centre was laid by the doyen of Indian Scientists, Prof. C.V. Raman, on 8th December, 1968.

Museum Activities

The Centre started carrying out its activities for teachers, students and lay public during 1967. The various Science Museums activities which have been carried out at the Centre during the past 17 years are described below:

1. *Exhibitions :* Within a short time of the opening of the Centre an exhibition entitled "Where in the World Am I" was inaugurated. The exhibits started with a canopy of galaxies. Identifying our own Galaxy and locating our sun in the Galaxy was the next exhibit. The other visuals consisted of the model of the earth, map of India, map of Gujarat and the details about Ahmedabad City. Several other panels showed the various inputs required for the Ahmedabad City to function. Similarly outputs of the City were also shown on various panels. The other panels showed the establishment and development of Ahmedabad. The whole exhibition made the citizens aware that they formed an infinitesimal part of the universe. Also the exhibition showed the interdependence of cities and their surrounding areas.

An exhibition on "HEART" was created during the year 1969-70 in collaboration with well known Cardiologists of Ahmedabad. Heart Foundation and Indian Red Cross Society of Ahmedabad were also involved in this exhibition. Very novel and effective audio-visual techniques like experimental use of motion, display motion and projection, colour and sound effects were used to advantage. There was an attractive folder which gave details about the exhibits as well as some basic facts about Heart. Alongwith the exhibition a film on "Open Heart Surgery" was also shown. This exhibition was set up in the local museum and attracted large number of visitors.

During the year 1970-71 we planned two small exhibitions one on "Germination of Seeds" and other one on "Molecules". Both these exhibitions contained several models and Audio-Visual display.

During the year 1971-72 we participated in National Science Exhibition at Delhi. We displayed several teaching aids, slide shows and Audio Visual materials developed at the Centre.

During the year 1972-73 we displayed an exhibition on educational toys organised by the British Council. We also put up an exhibition on "Pollution" at the local museum. The exhibition on Pollution dealt with various aspects of pollution such as Air Pollution, Water pollution, Noise pollution etc. Panels also explained pollution due to radiation and radio active material. Available data for various places in India were also presented. Along with this exhibition we made a set of cards which could be used in the school to explain various aspects of pollution. We also produced a booklet which gave more coverage on pollution. We produced a small exhibition on "Bones"—Shape, Size and Movement" in the Centre's exhibition hall.

During the year 1973-74 we put up a major exhibition on "Energy". The Energy exhibition dealt with various forms of Energry interconvertibility of energy law of conservation of energy. Various panels showed the energy cyles in nature and showing that ultimately sun is the major sources of energy on earth. Other panel showed sources of energy from earliest time and the various changes in sources. Ideas about energy crisis and future sources of Energy were also outlined.

During the year 1974-75 an exhibition on "Integrated Science" was displayed at the Centre on behalf of the British Council. An exhibition on "Man and Space" was also designed and developed at the Centre. This exhibition depicted the concept of space by man and impact of science on understanding of space and his conquest of space, utilisation of space for telecommunication were also showed.

During the year 1975-76 we had two exhibitions one on "Teaching of Physics" by Prof. B.L. Saraff, Jaipur University and "Recreational Mathematics" by Dr. Asarani Singal from Meerut University.

During the year 1976-77 we designed and developed an exhibition on "Water". This exhibition depicted water, cycle, need for water, in agriculture, Industry, household. Power production by water, Chemical and Physical properties of water, Science Units derived from water, Water purification, Sources of water etc. were shown. The exhibition also pointed out that with the increase in population, urbanisation and industrialisation, water is going to become an expensive commodity. During this year we also organised an exhibition on Primary Science and Mathematics teaching aids.

During the year 1977-78 we organised an exhibition on "Beyond the Human Eye". This exhibition dealt with the extentions of the human eye such as magnifying lens, microscope, telescope etc. The various kinds of microscopes were depicted as cross-secton models having the working principles. Apart from these exhibits various optical illusions were also presented to show the errors in perception of human eye.

During the year 1978-79 we displayed an exhibition on "Our Home the Planet Earth" designed by World Wild Life Fund. We also designed a small exhibition on "Fish". During 1st to 8th October, 1978 we organised "Snake Show". In this programme we had exhibited all the varieties of poisonous and non-poisonous snakes and reptiles in India. There were more than 200 non-poisonous snakes displayed in various areas. The visitors would handle snakes themselves. There was also live demonstration of poisonous snakes. Slide show, films on snakes were also presented. More than 60,000 visitors enjoyed this snake show. The usefulness of snakes were stressed.

During the last few years we have set up exhibitions on 'Salt', in collaboration with Central Salt and Marine Research Institute, Bhavnagar. "Measurements" and "Senses" and "Teaching Aids" at Secondary and Higher Secondary levels. The exhibition on "Senses" was designed for primary students. At present we are working on exhibitions in "Mirrors" and "Inside of Things".

2. *Participatory Science Exhibits*

The Centre decided to develop Participatory Science Exhibits for the visitors during the year 1972-'73. We started designing small Participatory Science Exhibits in our workshop and started installing them in open quadrangle of our Centre. The Centre has designed more than 100 Participatory Science Exhibits in the area of Science and Mathematics. These exhibits have two or three line instruction, the participant can read the instruction and play with the exhibits, enjoy the exhibits and interact with the exhibits. We have recently published a book on "Participatory Science Exhibits" which is available from the Vikram A. Sarabhai Community Science Centre. These Participatory Science Exhibits could be puzzles, playthings, interactive Science Exhibits, illusions, display for observation and study or very interesting charts. In majority of Science Museums participatory exhibits have become the major forms of exhibit design in recent times.

3. *Science Play Room:*

We started the Science Play Room activity during the year 1976-77. Puzzles, Playthings, games and kits were kept in play room for young children from 3 to 12 years of age. Participants can freely interact with them on all Saturday afternoons and Sunday mornings. We have tried out nearly 100 items in Science play room. And based on our experience we have developed playthings for preprimary children to be used in Anganwadi. Some of the playthings are also being manufactured and marketed by M/s Pneumatic Controls, New Delhi.

4. *Science Playground*

In the open space surrounding the Centre we decided to set up a Science Playground during the year 1974-'75. We got a gist of life size Model of Rohini Rocket from Vikram Sarabhai Space Centre, Thumba which was installed in the playground. Later on several items such as Colour Filters, Colour Mixing, Music Pillar, Sand Pit, Evolution Pillar, Simple machines, Windvane, simple gears, mechanical energy transmission and mechanical advantages were installed. Also installed were musical pipes, tactile blocks, leaf imprints etc. We have also got a totem pole carved out to show evolution of life on earth. This is also displayed.

5. *Aquarium:* The Centre has a large aquarium in the Centre of the quadrangle which could be seen also from the basement. The aquarium has a variety of fish, as well as tortoise. Adjoining is an aviary where several variety of birds are kept in a very large enclosure. The visitors can observe the various birds. The budgerigers (Australian love birds) lay eggs and the young ones could be observed by the visitors. In the Biology Laboratory we have tried out keeping small pets such as rabbits, canaries, chickens etc., and children can study them.

6. *Hobby Activities:* The Centre runs several Hobby Activities such as Model Rocketry, Amature Radio, Electronics, Photography. These clubs are very popular and people have to book in advance to participate in these activities.

7. *Night Sky Viewing:* The Centre has a good Telescope and organise Night Sky Viewing on a regular basis.

8. *Popular Science Lectures:* The Centre organises Popular Science Lectures several times in the year. For the Secondary School students many times programmes called "Meet the Scientists" were organised so that the students can interact with professional scientists.

9. *Lecture Demonstration:* Several lecture demonstrations have been designed and presented by Centre's staff to a large number of visitors. The topics dealt with are 'Physical and Chemical change', Soil, Electrochemical Series, Energy, Waves, Electron and Light, Electricity and Magnetism, Newton's Laws. Some lecture demonstrations have also been delivered by visiting scientists.

10. *Other Activities:* Apart from all the above Science Museum activities the Centre also conducts training programmes, workshops, seminars for different groups in Audio-Visual techniques, Mass Media, Script writing and drama presentation and puppet play, participatory Science Exhibits

etc. The Centre's staff also participate with collaborative programmes with other institutions such as School of Architecture, National Institute of Design in developing ideas for models, exhibits, etc. The Centre has made slide shows on several Scientific topics and has been involved in production of video programmes during the SITE project related to Science and Technology in collaboration with Space Application Centre. During the last one year and a half the Centre has started using computers for training students and teachers and we are planning to develop exhibits based on microcomputers. The visitors would be able to interact with the micro-computers in learning Science and Mathematics at the Centre.

The Centre has published nearly 100 publications regarding various programmes and projects undertaken at the Centre. The Centre has carried out projects in Environment, Renewable Energy Sources and Nutrition and Health.

Science Museums should be concerned more with people rather than things that are displayed. The larger science museums are more interested in the historical aspects of science and technology. They have a large staffing to prepare the exhibits. This is largely the model of a traditional western science museum. One of the purpose of a science museum is to supplement school curricula at several stages. The other goal is to impart informal education. The basic features of many new science museums are interactive or participatory exhibits rather than push button or demonstrative exhibits commonly found in our museums in glass cases.

Agharkar Museum, Allahabad University, Allahabad

S.P. TIWARI

The Agharkar Museum is well-known for its rare collections of living and fossil plants, belonging to different group of plants. A fossil petrified log (tree trunk) known as *Dadoxylon* sp. is a significant addition to the museum's collection which is vertically placed in the central part of the museum hall. The tree trunk was collected by Drs. V.K. Singh, D.K. Chauhan, S.P. Tiwari and D.D. Nautiyal of the Botany Department, University of Allahabad, Allahabad, from Rajura village which is situated on Asikabad Road (225 Km. Nagpur) in Chandrapur District of Maharashtra. The height of the trunk is about 8 feet and the girth, at the base is about 6.5 feet. It was collected in three pieces, from a sandy nalla and was preserved in its natural color (darkton) and in petrified condition. The weight of this log is about 2 tons. The fossil trunk (*Dadoxylon* sp.) is about 280 million years old and it belongs to Kampti formation of Lower Gondwanas of India. It is beleived that during Carbo-Permian times, the five southern continents viz. South America, South Africa, India, Australia and Antarctica were jointed together forming a single land mass known as Gondwana Land. This term Gondwanaland is proposed after the Gond tribes of central India. In the Lower Gondwana (Carbo-Permian) time a luxuriant vegetation of Glossopteris flora existed in which the coniferous plants of Gymnosperm group were in dominant state. The morphological and anatomical study of this fossil tree trunk suggest that this wood may belong to conifers. It is also beleived that the present coal is a product of these woods which were present at that time. By seeing the length (8 feet) and girth (6.5 feet) one can easily reconstruct the complete height of the plant and it may be about 150 feet. The wood having this girth and the length is for first time reported from the Lower Gondwanas of India.

A New Ivory Gallery in the Salar Jung Museum, Hyderabad

D.N. VARMA

The Salar Jung Museum is a treasure house of art objects coming from different parts of the world. It is not surprising therefore that the museum has some exclusive galleries for the art of different countries. Thus the museum has a Chinese gallery, a Japanese gallery, a French gallery and so on and so forth.

Earlier, the ivory carvings from different countries were presented in the context of art of that country in the Salar Jung Museum. Thus the Japanese room had on display wood carvings, satsuma pottery, embroidery, mother of pearl work and also ivory carvings.

While there was nothing wrong in this scheme of presentation a practical difficulty arose in acquainting the visitors with the diversity of Salar Jung's ivory collection. To take an example the museum could not afford a room for the art of Goa or of Germany because of the paucity of other art-forms of those countries in the museum and yet the museum had some excellent pieces of Ivory from those countries. Besides the ivory collection of the Salar Jung Museum is indeed sizable and even if some pieces were to be displayed in context of art of a particular country the remaining collection was still sumptuous. It was in these circumstances—limitation and abundance—that the idea of a separate gallery, devoted exclusively to Ivory Carvings germinated.

As far as a medium of art expression in India is concerned ivory certainly deserves a gallery devoted exclusively to it. Literary, archaeological and epigraphic evidences reveal that ivory enjoyed tremendous popularity in India from times immemorial. Ivory objects excavated from the Indus valley can be dated to the second millennium B.C. and ivory objects fashioned in Gandhara later, display healthy foreign infleunce. The ivory carvers of Vidisha had become famous for their expertise by the second century B.C. The accounts of foreign travellers testify to the continuity of the tradition throughout the centuries. Even today the art of ivory carving survives at Delhi, Mysore, Travancore and Vishakhapatnam.

The importance of having a separate gallery for ivory carving taking into account its popularity in India can hardly be minimised. The fact however is that ivory carving has been popular all over the world on account of its beauty and durability. Though the term ivory is normally associated with the tusks of an elephant yet in fact it includes the teeth of the Walrus Narwhal, an arctic dolphinoid animal and the Hippopotamus. Thus some countries could have ivory carvings even if they did not have elephants. The teeth of all these animals are as dense as the elephant tusk and have the gelatinous substance in their compact pores which provided such a charming polish to ivory.

The new ivory gallery has set the first show case for the introduction of the theme. The show case presents an uncarved ivory tusk and the picture of an elephant having long tusk. Then on, the visitor is introduced to full length carved ivory tusks coming from diverse countries. Both Burmese and Chinese craftsmen specialised in carving a single tusk with several figure subjects. The minute details and the flawless carving of these tusks prove the serious attention paid to this art in those countries.

The next show case also presents large chunks of Ivory tusk carved with a multiplicity of figures. A Japanese rowing boat deserves mention in this context on account of its elegance. The first two cases have examples of Indian workmanship also on large chunks of ivory tusk.

The third show case onwards one can see the development of the art in India. Among the early pieces are a Kakatiya ivory carving and some examples of coloured ivory. Though most of the Indian ivory carvings are late, yet they acquaint the visitor with the wide range to which the Indian ivory carver could put his skill. The different show cases have figures of Hindu, Buddhist and Jain deities, secular figure work, models of monuments like the Taj Mahal and the Qutub Minar and secular objects of daily use, like toilet compacts and boxes. The piercing work practiced in Andhra is indeed a great attraction. Paintings on ivory were extremely popular at the time of the end of the Mughal era and one show case is exclusively devoted to this work.

The other long wall of the gallery has show cases which present the other traditions. Noteworthy are the carved concentric spheres of ivory from Canton in China, that baffles the imagination of the onlooker. Though the Japanese themselves never had elephants they used to import large quantities of Ivory from Africa and their skill in carving ivory is phenomenal. The delicacy and naturalism in the Japanese examples in the gallery bear an unmistakable stamp of their workmanship. There are ornamental figures like Geisha girls etc. and also what are known as Netsukes. Measuring from half an inch to an inch the Netsukes are little bits of Japanese mythology and Zoology, popular themes of art in Japan. The art of Netsuke was introduced in 18th century and disappeared in the next century from Japan but has left an indeed rich legacy. The Netsuke is usually a boss or toggle used for thrusting the sash to balance the fan, tobacco purse, medicine chest etc. to which it is attached by a silk thread or less often a little chain. Carvings of this category have invariably two holes.

The gallery has a show case devoted to European ivory. The Italian ivory carvings resemble their marble sculpture in neo-classical style. Ivory figures from Germany represent genre scenes of the nineteenth Century, notable among which is a musical orchestra along with the conductor.

An exclusive show case is devoted to Goan ivory. Not only did the protagonists of the Hindu, Buddhist and Jain faith made use of ivory but the Christians too carved madonnas and their saints. The Goan ivory is all the more interesting as it reveals the intermingling of the European and the Indian styles.

A table show case in the centre of the galery with a perspex top sheet presents an ivory mat carved at Ramnagar, U.P. in the 19th Century and two island show cases on either side of the mat show case present examples of ivory furniture.

The new gallery gives a vivid account of the significant place of ivory as a medium of art in the history of decorative arts. The accent is not on antiquity but on diversity and the worldwide popularity of ivory as a medium of art.

A Brief Note on the Exhibitions held in the Prince of Wales Museum During the Year 1983-84

B.V. SHETTI

The Prince of Wales Museum organised an exhibition on 'The Krishna Theme in Indian Art' in collaboration with the Heras Institute, Bombay and the Museum Society of Bombay, to coincide with the Janmashtami celebrations. The exhibition was open to the public from 25th August to 18th September 1983.

The Museum also organised a programme of Haveli Sangeet by Shri Mukund Maharaj Goswami of Mota Mandir, Bombay on 5th September 1983.

There were 182 exhibits on display out of which 82 were paintings, 5 pichchavais, 1 MS., 2 glass paintings and 41 other objects including prints of the Bhagvata Purana and Gita Govinda.

The exhibits were mostly drawn from the Museum's own collection of paintings, decorative arts, bronzes, sculptures plus those from the Heras Institute, Bombay and a few private collectors.

On 15th September 1983, the Prime Minister Smt. Indira Gandhi paid a special visit to see this exhibition.

The Museum organised an exhibition इये मराठीचिये नगरी i.e. Art Treasures from Museums in Maharashtra, in collaboration with the Directorate of Archaeology & Museums in Maharashtra state, at the request made by the Special Committee for Reception, Ceremonials and Functions for Filmotsav 84. The exhibition was inaugurated on the 6th January 1984 by Hon. Shri Sudhakar Naik, Minister for Education, Technical Education, Government of Maharashtra.

The institutions which participated with us in this venture were The Heras Institute Museum, Bombay, The Bhau Daji Lad Museum, Bombay, The Asiatic Society, Bombay, The Marathawada University and Shri Bhagwat Ramlingappa Lamture.

There were 350 exhibits ranging from 1600 B.C. to 19th century. Though our emphasis was on the art of Maharashtra we also included outstanding objects from other regions.

His Excellency Shri I.H. Latif, Air Chief Marshal (Retd.), Governor of Maharashtra and Begum Bilkees Latif visited this exhibition on 3rd February 1984.

The exhibition which attracted large number of visitors was open till 12th February 1984.

Some Rules for Preservation of Museum Objects

POONAM AGRAWAL

From the earliest days of recorded history man has been a collector. At first he accumulated and stored only those items essential to his existence—food, clothing and weapons. Later with growth of civilization, he started collecting items which he liked and which were of comfort to him, ensured his safety and made him enviable, like jewels, gold, silks, tapestries, arms and armour, sculptures and paintings. Collections became a reflection of cultural refinement, interest, prestige and individual taste. In time, wealthy collectors, due to their large collections, had to store them in separate large buildings. Some benevolent collectors opened these collections for people to come and see. This was the first step towards the making of a museum.

Museum custodian or a private collector has the responsibility of being able to pass on to the coming generations the national cultural heritage which is entrusted to his care. Sheer mishandling, negligence and lack of knowledge on the part of curator or private collector may rob the nation of the rich heritage which is its.

Objects which are kept in a museum whether they are on display or are kept in store rooms are susceptible to deterioration by different agents. Some materials like paper, textile, ethnographical objects are more prone to deterioration than stones, metals, etc. which are quite durable. If a few simple and general precautions are observed, we can easily save our heritage. An attempt has been made in the following pages to describe these rules.

I. General Rules for Care and Handling

1. *Regard all art objects as irreplaceble:* While handling any art object, it should be borne in mind that if the piece is damaged there is no way to replace it. So all the objects shoud be handled with extreme caution. Both hands should always be used for handling objects.

2. *Clean hands:* Hands should be cleaned thoroughly before touching any object. To avoid the dust and grease of hands dirtying the object, it is preferable that clean cotton gloves are worn.

3. *Prohibition of smoking:* Smoking should be strictly prohibited in galleries as well as in storage areas. Cigarette smoking is not only a fire hazard but cigarette smoke leaves a yellow oily deposit.

4. *Use of trolleys:* Small objects in trays and trays in trollies should be the general rule.

5. *Slow Movement:* Better late than never is a saying which can aptly be applied here. While transporting objects from one place to another it is always better to move at a slow pace to avoid accidents resulting in shocks and cracks to the objects. While going down a slope one or two men should precede the conveyance to slow down the speed.

6. *Coordination of movement:* If the style in which the object is to be moved is planned beforehand, there is no confusion at the time of action. The material of objet, its strong and weak points should be studied in advance so that points where stress can safely be applied is known and no unwanted pressure is given to fragile areas.

7. *Avoid unnecessary movement:* The place where the object has to be kept after shifting should be predetermined to avoid repeated and unnecessary movement of objects. Repeated movement of objects may be fatal to them.

8. *Avoid overloading of carrying device:* The conveyance carrying the objects should not be filled to more than its capacity. It should be seen that the objects do not protrude out of trollies. Doing so increases the risk of disturbing the balace of objects and their falling down.

9. *Adequate adding materials in packing cases:* Packing cases in which more than one object is kept should have separation battens, padding and a shock-absorbent material between the pieces.

10. *Search packing material:* After taking out the object from the packing cases a thorough search of the packing case should be made. Valuables and irreplaceble objects have been lost in packing materials. All the fragments howsoever small found with any broken objects should be preserved and kept carefully. All the pieces and tiny fragments of objects are necessary for the restoration.

11. *Consult a Conservator when in doubt:* Whenever there is doubt about the handling or movement of art objects a conservator/restorer should be consulted. (The greatest exposure to possible damage due to human handling occurs within the museum).

12. *Use pads, battens, blankets and wedges:* While being moved all the sculptures should be kept with enough padding. These padding and other protective covering should be clean or they might mar the surface of object permanently. Extra precautions while moving, prevents unnecessary jerks to the object. Over-padding is also as harmful as no padding. It creates unequal pressure within the structure, there by causing breakage by self-weight

13. *Even distribution of weight:* It is necessary that weight of the sculpture is evenly distributed. While moving a tall sculpture, it is essential that it is laid on a trolley instead of taking it in standing position.

14. *Projecting parts require special attention:* Projecting parts of any

sculpture or any other object should not be used as handle for carrying them. Rather these parts should be supported and padded in a better way to prevent them from shocks and getting detached from the main body.

15. *Use both hands to move any object:* Both hands should be used to handle any object, howsoever small it might be.

16. *Move one object at a time:* We should never try to save time by trying to move more than one object at a time by hand. There are more chances of the object falling and being damaged this way.

17. *Wear gloves:* To avoid the dirt and oils of the hand damaging the object it is advisable to wear gloves while handling objects. Though when handling glass objects, ivory objects and jewellery it is advised not to wear gloves. Glass and ivory objects are slippery and so there are more chances of their slipping from gloved hands. Glove fabric might get entangled in the gem setting of the jewellery thus loosening the setting from which then a precious stone might be lost.

18. *Labelling:* All the boxes and drawers having objects should labelled properly and a catalogue be prepared. This will avoid unnecessary handling of object and so there are lesser chances of accidents.

19. *Storage:* For storing the framed objects all the excess wire, screw eyes, hooks and wires should be removed from the frame.

20. *Fumigation:* Fumigation is a very good method to fight against insects and fungal growth. A small storage area or even an entire room may be sterilized with a gaseous fumigation. The fumigated area should be thoroughly sealed. All museum objects should be fumigated from time to time.

21. *Exposure to light:* Any dyed or coloured surface should not be exposed to artificial or sunlight for long periods. This causes fading of colour which cannot be restored back by any method.

II Rules for oil Paintings (no convas and wood panel):

Do not touch. The painted surface should never be touched with hands as it causes chipping of paint from surface.

1. *Avoid pressure on back side of convas:* Back side of a painting should always be covered with thick card board or a beewer board. If the paint structure is weak applying pressure on the back can further weaken it.

2. *Examination before moving:* Before moving any painting the strength of the frame should be checked. If it is weak, first, steps should be taken to strengthen the support and then effect transportation. It should also be checked that the painting is secured in the frame.

3. *Record conditions:* The old and new condition of a painting should always be noted and shown to a Conservator from time to time. Photographs showing the new developments in the condition of the painting should also be taken to illustrate the written text.

4. *Avoid shocks to the painting.* Painting should never be secured to the frame by nails as hammering can cause movement of painting and

damage the painted surface. Paintings should always be secured to the frame by metal straps.

5. *Stock paintings facing outwards with separation Board:* In ideal conditions paintings should not be stacked. Lack of space though compels most museum curators to stack their paintings. A corrugated board should always be kept in between different paintings. The painted surface should always be kept outwards. The board should be several inches longer than the frame.

6. *Paintings should rest on cushioning material:* Paintings which are not hung should never be kept directly on floor. A cushioning material should always be used whether the painting is on display or is being transported in a conveyance.

7. *Rolling paintings for shipment:* If a painting is very large it should be taken out of the frame or stretched and then should be rolled. This should be done very carefully and all the people who are to participate should from before hand know the exact thing they have to do. Coordination of action is very necessary in this operation. Rolled painting should be secured in a water proof sheet and sealed. It should never be tied with a rope, cord or wire.

8. *Store picture with flaking in horizontal position:* Paintings which have flaking paints should be kept in horizontal positions to avoid loss of paint/ pigments.

9. *Recommended RH:* Idealy paintings should be kept in well-ventilated galleries and rooms. The perfect RH is 55% at 18°C.

III Rules for Paper Paintings

Protection of paper: Paper paintings should be protected from various deteriorating agents like termites, book lice, cockroaches, humidity, acidity, silverfish, hookworms.

Removing mould: Removal of mould should be done by an experienced conservator, restorer. Mould growth should be removed away from the clean part and done in open air or in an airy room.

Pulp paper: Pulp paper which is made of wood fibre should never be allowed to come in contact with it as due to acids in the low grade paper (wood pulp paper) the better quality paper will also be discoloured. Paper takes on the grain of the wood in the form of discoloration which allowed to come in contact with it. For this reason wood should never be used as a backing when framing a picture.

Framing: Never frame a painting with painted surface directly touching the glass. Direct touching of painting leaves an impression of paint on glass thus robs the painting of its original shine and lustre.

Temperature and Humidity: Framing protects the paintings only from dust. Paintings should also be protected from large variation in temperature. Large changes in temperature, causes condensation on glass which is harmful both to the pigments and paper. The RH of the room where the paintings are kept should idealy be around 50%. 60% is the safety limit when RH reaches near 70% mould formation and danger to paper is imminent.

IV Rules for Sculptures

Method of transportation: Any tall sculpture should never be transported in standing position. If transported like that there are more likelihood of its falling because of higher centre of gravity.

Take the transport to the sculpture and not sculpture to the transport: For transportation of sculpture it is best that sculpture is kept off the ground for as less time as possible. So it is best to bring either the carrying boxes or the trolley to the sculpture instead of vice versa. This way there are lesser chances of the sculpture dropping and breaking.

Movement of Sculptures with fixed bases or pedestals: If a sculpture is secured to the base it is best that it is not moved without first checking the base to see if it is heavy enough and will not topple. If the base is not heavy enough ballast should be added to the hollow base before moving.

Avoid moving wooden sculptures to place with a drastic change in the humdity: A wooden object is very susceptible to changes of humidity. If the object is moved from high humidity place to lower humidity place it is bound to warp. This happens as changes in humidity causes wood to alternately give and take moisture.

Action against insect attack: White powdery substance near the object is the first visible sign of the object being infested by insects. All the wooden objects should be checked on regular basis for possible attack of insects. The objects should be fumigated regularly. Holes after the insects are killed should be filled with bee's wax so that fresh attack of insects can be spotted immediately. Spraying of the objects with insecticide is not found very effective for killing pests which bore into wood.

Storage: Do not store sculptures of different materials together. As sculptures are made of different materials it is difficult to set aside strict rules for their care.

Desired RH for sculptures

Metal sculpture: 40% RH is ideal for such objects. They can be stored with safety upto 45%. After this limit corrosion/rusting starts.

Ceramic sculpture: The desirable RH for such sculptures depends on the degree of firing. As a general rule though, no ceramic object should be exposed to high RH.

Wood sculpture: desired R.H. is 55%.
Stone: desired R.H. is 50%.
Plaster sculpture: desired R.H. is 50%.

V Rules for Ceramics and Glass

Protect ceramics against salt: Salt is a major enemy of pottery. It tends to crystalize resulting in flaking of glaze.

Unbacked clay should be dusted with a brush: If dust accumulates on any pottery surface especially on unbacked clay is advisable to clean it with a soft brush rather than a cloth. No solution should be applied to clean it under any circumstances, though backed clay material even if it is unglazed can be cleaned with a detergent solution.

Use of hot water is prohibited: If a creak is seen in the glaze of the pottery then it should never be washed. Crack appers due to unequal expansion of glaze and the body of the object. Hot water should never be used for cleaning of objects.

Wrapping: Cotton padding can be used for all objects except for objects with carving and rough surface. Cotton tends to cling to such objects and it is then difficult to remove it.

Unpacking: Unpacking of such fragile objects should always be done on padded table to avoid accidents.

RH: Ceramics should never be kept in areas of high RH. Though the ideal RH conditions depend on the degree of firing. It is difficult to establish the degree of firing by observation only and this information is generally lacking. So to be on safer side RH should range between 40% and 55%. For glass RH should be around 40%.

VI Rules for Metal Objects

Storage of silver: Silver objects should be cleaned thoroughly before putting in plastic bags for storage. Silver should never be polished with a mechanical machine buffer as it is extremly harmful. The drawers, cabinets and containers used for keeping silver should be lined with tarnish resistant cloth.

Dampness should be avoided: Metal objects though highly resistant to atomspheric conditions are susceptible to be damaged if kept in humidity for long time. Keeping the object in humidity for a long time causes bronze disease. Affected pieces should be separated and treated by an expert. Bronze disease is characterized by the presence of green encrustation on the surface containing chloride.

Arms and armor: Arms and armour should ideally be kept in airtight boxes which is always not possible. In such cases arms and armour should be covered when in storage. Oil or more preferable wax and silicon products are used as a protective covering against dust.

Plated metal objects should not be polished often: Silver plated copper and brass objects if polished too often will loose the polish soon, such objects can also be lacquered. The only drawback of lacquering is that in lacquer finish cracks air will seep in through the cracks and the whole finish will peel and discolour. In such a case the whole lacquer is to be removed and a fresh coat of lacquer polish applied to it.

Desired RH: Low RH about 40% is ideal. But RH in the range of 40-45% is suitable.

VII Rules for Ivory Objects

Do not expose Ivory to sunlight: Ivory if exposed to direct sunlight turns yellow in colour. So its exposure to sunlight should be avoided.

Carved ivory should not be wrapped with cotton: Care must be taken to avoid wrapping of ivories in cotton or any such material whose particles might get lodged in the carvings and crevices of the objects. Fragments are also seen to be lost easily in the folds of cotton.

Cover all objects: All objects should be kept under cover to protect it from dust.

Wash with mild detergent, drying it immediately: If the ivory is in good shape then it can be cleaned with mild detergent and then water. The use of water should be kept at the minimum. The object should be dried immediately with a soft fabric.

Salt encrusted or fossilized ivory should not be washed: Ivory objects if buried under earth for a long time become encrusted with salt or they become semifossilized. Such objects should not be washed. With age ivory also becomes brittle.

Avoid sudden temperature changes—heat and humidity: Irrespective of age all ivories are very delicate and prone to damage if exposed to heat, humidity and temperature changes. The damage to ivory is so quick that the cracks which appear can actually be seen forming with naked eye.

How to lift ivory: To lift ivory objects off a shelf, the edge or rim should never be held. The best procedure is to slip a cardboard piece underneath the object and to lift the whole carbdoard supporting the object with the free hand.

RH: Ivory needs RH on the higher level. A RH of 55% is recommended. The humidity must be kept constant.

VIII Rules for Textiles

Never fold textile: Textiles should never be folded. The fabric from the fold becomes weak and crease breaks threads. The best way of keeping long textiles is to roll them on rollers. Other costumes can be hung but not on plastic hangers. Plastic if sealed with paradichlrobenzene (an insecticide) softens and can damage the costumes.

Cleaning of textiles: Dust which is a major problem in all Indian museums should never be removed with a duster especially a feather duster. By dusting the position of dust only shifts but does not leave the garment. If the garment is in good condition vacuum cleaning it by hand is safer. If the garment is sturdy it can also be washed with mild detergent. A nonionic detergent should be used. The dyes of garment should be tested for fast colours before putting in water.

Avoid insect attack: If the display area and stores are kept dry and clean, chances of insect attack is lessened. Textiles of animal origin like silk and wool are more prone to attack by insects. To remove insect eggs and larvae textile should be cleaned with a soft brush and then fumigated. Commercial sprays and dusting powder to combat against silver fish should be sprayed in the storage area and exhibition area but it should not be sprayed on textile. The object should also be fumigated at regular intervals by an expert.

Early removal of stains is best: Stains if not removed immediately undergo a chemical reaction with the fabric and then it is difficult to remove them. Extreme caution should be observed for removing the stains.

Acid free tissue paper: All the fabrics should be kept or hung wrapped in acid free tissue paper. Wrapping avoids dust to damage it. Ordinary tissue paper has residue of acids which damages the fabric when it comes in contact with it. Tissue should be inserted in such a way that it comes in between the different folds. Crumpled tissue paper is more effective than uncrumpled one.

Packing and storage: All the pins and dress shields should be removed before storing any garment. Pins apart from making a hole in the garment also get rested and stain the garments irreparably. Garments for shipping or even for storage should not be packed tightly in a box. If they are packed tightly the crease will be pressed more, thereby weakening the thread too much.

Keep writing material and sharp objects away: Pens, pencils, etc. should be kept away from textiles or they might accidently cause stains which are impossible to remove. Without noticeable damage, sharp objects may tear the garments and hence must be kept away.

Roll on drums or cylinders: The best way of storing or shipping a textile is to roll it on drums or cylinders. The cylinder can be of sturdy card-board and should be as wide as possible. Care should be taken that no crease is rolled in. Acid-free tissue paper should also be rolled with the textile. The edge of the textile should be at least one inch away from the ends of the cylinder.

Storing of small pieces of textiles: Small pieces of textiles should be sealed in between sheets of plexiglass. This way the textile is safe and also can be studied easily from both the sides. Using this method we can put identifying label of the textile on the outer surface of the sealed unit. Moth crystals (Paradichlorobenzene) should be placed if the textile is wrapped in tissue paper.

Cover costumes and mannequins with transparent cover: Mannequins though expensive are best for storage and exhibition of costumes. Mannequins when in storage should be covered with plastic covers. Even if no costume is displayed on the mannequin it should be kept covered.

Hanging a costume rather than folding it for storage increases the life span of the textile. Instead of hanging on mannequins padded hangers can also be used. The hanger and the padding should be of materials which are not harmful to the garment.

Tar paper should not be brought near the garment: Tar paper should never be used for packing garments. Contact with tar paper might stain it, specially in hot and humid weather.

Desired RH: Textiles need dry atmosphere to be kept in perfect conditions. The textile gallery should be well ventilated. The ideal RH for maximum protection is about 40%. Self-adhesive tapes should never be used for textiles. Adhesive used for doing any pasting work should fulfil a few conditions. They must be completely transparent and colourless. Their colour and adhesive should be applied at room temperature. It should not in any way harm the dye or alter the properties of the textile.

IX Rules for Jewellery

Cotton should not be used for storage and shipment: Jewellery should not be packed in cotton. Cotton particles tend to adhere to the delicate carving of the piece and spoil the surface, if cotton gets entangled in the gem setting. Before disposing of the packing materials it should be thoroughly searched for any loose piece or dislodged stone article.

Wrapping: All the jewellery pieces should first be wrapped in acid free tissue paper or clean soft cloth and then kept in labelled boxes or bags. Such wrapping also prevents shocks which the object might incur while being transported. To prevent dust from accumulating on the object, it is preferred that it is stored in closed cupboards. Each piece should be wrapped separatly.

Desired RH: Maintain about 40% RH in the galleries where jewellery is displayed. Jewellery tarnishes in high humidity.

X Rules for Tapestries and Rugs:

Dry heat is more harmful than wet climate: The condition of a tapestry is determined primarily by its age, its exposure to adverse conditions and the way in which it was used in the past. To at least preserve the condition of the rug in which it was received, it is advisable that it is not exposed to dry heat. Dry heat robs the fibres of is original resilience and thus results in rotting of threads. Exposure to sunlight causes the same damage.

Method of detection of damaged fibres: Damaged fibres generally go unnoticed if the object examined while hanging or spread out on floor. The object should be held against light and then examined inch by inch for any small holes or thin areas.

Repair immediately by expert: Torn articles should be repaired as soon as possible. Only experts should be allowed to restore the articles. If the object is hung or handled frequently in its damaged condition, the chances of its condition deteriorating faster increase very much.

Remove dust with a vacuum cleaner: Dust from tapestries should be removed with a vacuum cleaner. Dust should never be removed by a duster. Duster just rearranges the accumulation. Vacuum cleaner should be used only if the tapestry is in good condition, the edges are not frayed and too much restoration work is not done. Vacuum cleaner should be used with even strokes and always in the same direction, either vertically or horizontally. Both sides of the object should be vacuumed.

Storing: When the object is not on display it should be kept in a dark room. Ideally tapestries and rugs should be kept open, though lack of space sometimes makes it impossible to keep the object unfolded. In such cases the object should not be folded but rather rolled on tubes with right side inside. The tubes used for rolling the tapestry or rug on should be a few inches longer than the object. Metal tubes should not be used for rolling the object on. Metal oxidizes, rust causes serious damage by staining. Thoroughly seasoned light weight wooden poles should be used. If the tapestry is light weight a cardboard tube can also be used. A cardboard tube should first be covered with acid free tissue paper.

Creases should not be rolled in: Care should be taken while rolling that a crease is smoothed out. A crease if rolled for too long a time will weaken the thread and cause them to break. If folding is inevitable care should be taken that the fold does not come on earlier creases.

Storage of small specimens: Small specimens or fragments of tapestries can easily be stored in a flat position. These small pieces can be sealed between sheets of plexiglass. This method prevents frequent handling and enables the specimen to be studied from both sides. Also an identification label can be put on the sheet of plexiglass. If sealing between layer of plexiglass is not possible individual samples should be kept in shallow drawers. If two or more then two samples have to be kept in one drawer, a sheet of acid free tissue paper is used between each specimen.

Humidity control: If the store rooms and galleries of tapestries are not airconditioned they should be well ventilated. Periodic movement allows circulation of air. The stored specimens should be periodically unrolled to allow air to circulate.

Desired RH: RH should be kept between 40% to 65%. Humidity beyond 70% is dangerous for the object.

New Acquisitions

Prince of Wales Museum

A.K. DAS

List of objects acquired during the year 1983-84

Sr. No.	*Acc. No*	*Description*
1.	83.1	Panchatirthika of a Jina Sandstone, Madhya Pradesh, *c.* 11th cent. A.D. Mts. 28 x 70.8 cms.
2.	83.2	Mr. Gladstone introducing the Home Rule Bill in the House of Commons, Feb. 13, 1983, Engraving on paper. Sepia print. Mts. 60 x 82.5 cms.
3.	83.3/1	Krishna and Radha Ivory; Rajasthan. Prob. Nathdwara. Late 19th cent. A.D. Mts. 22.5 x 19 x 14 cms.
4.	83.3/2	Snake-Charmer Ivory, Rajasthan, *c.* late 19th Early 20th Cent. A.D. Mts. 10.5 x 15 x 8 cms.
5.	83.4/1a	Turban cloth Cotton, brocade ends, Surat. 19th Cent. A.D. Mts. 792 x 34 cms.
6.	83.4/1b	A Plain Piece of a narrow strip of red cotton cloth is alongwith the turban, Mts. 248 x 17 cms.
7.	83.4/2	Blouse Silk, Tanchoi, Surat. 20th Cent. A.D. Mts. 45 x 40 x 69 cms.
8.	83.4/3	Sari Silk, Tanchoi, Surat. Mts. 122 x 600 cms.
9.	83.4/4	Blouse Silk, Tanchoi, Early 20th Cent. Mts. 45 x 38 x 65 cms.
10.	83.4/5	Blouse Satin, hand-embroidered, Surat. Late 19th cent.
11.	83.4/6	Blouse, Silk, embroidered material, Chinese 20th cent. Mts. 44 x 40 x 74 cms.

12.	83.4/7	Vest for ladies, Cotton and Silk, Surat. 19th cent. Mts. 47 x 38 cms.
13.	83.4/8	Ijar (pyjama worn by Parsee ladies), Silk, Surat, 20th cent. Mts. 75 x 86 x 56 cms.
14.	83.4/9	Blouse Silk, hand-embroidered, Surat, 19th cent. Mts. 44 44 x 38 x 68 cms.
15.	83.4/10	Patola Sari Silk, Patan or Surat, 19th cent. Mts. 108 x 464 cmc.
16.	83.4/11	Coat (for Navjot) Velvet, Hand-embroidered, Surat, A.D. 1872-74, Mts. Coat 45 x 36 cms. sleeves 13x35 cms each.
17.	83.4/12	Coat (for Parsee ladies) Velvet, hand-embroidered, Surat, 19th cent. A.D. Mts. 50 x 37 x 50 cms.
18.	83.4/13	Frock (for Parsec girl) Georgette, Bombay, early 20th cent. Mts. 77 x 37 x 34 cms.
19.	83.4/14	Blouse Silk, embroidered with the same colour, silk into flowers and leaves motif. Early 20th cent. Mts. 41 x 46 x 49 cms.
20.	83.4/15	Sadra Cotton cloth (malmal), Bombay early 20th cent. A.D. Mts. 108 x 104 x 76 cms.
21.	83.5	Sari Silk, Tanchoi, Chinese, late 19th cent. —early 20th cent. A.D. Mts. 113 x 432 cms.
22.	83.6	Shawl Wollen, Loom-woven, Paisely, 3rd quarter of 19th cent. Mts. 324 x 156 cms.
23.	83.7	Raga Ramaputra Aurangabad, *c.* A.D. 1700, Mts. 25.5 x 38.5 (with border) 20 x 32.5 cms. (without border)
24.	83.8	An Illustrated folio from a MS. (Rasikapriya), Malwa. *c.* A.D. 1650, Mts. 17.5 x 20 cms.

Recent Acquisitions of Salar Jung Museum

M. BASAVA RAO

The Salar Jung Museum during 1983-84 could acquire fifty-nine art comprising Indian bronzes, miniature paintings, textiles, arms, stone sculpture, ivory, wood and metalware.

Among the broznes noteworthy of mention are the slender and elegant seated figure of the female deity Annapurna holding a lotus in one hand and a bowl in the other assignable to Chola period between A.D. 12th to 13th century; an incomplete panel of Saptamatrikas with only four matrikas and Ganesh seated on the extreme right on a rectangular asana assigned to 7th-8th century Chalukyan period and the beautiful and bewitching figure of Ganesh seated on an elevated lotus throne with his vehicle rat prominently shown near the base of the throne; this is a superb example of the workmenship of Pala style of 10th century (see figure).

Out of the four Indian miniature paintings acquired, mention may be made of two paintings depicting episodes of Sarangtatva series, of late Rajasthani style. One of these paintings (see figure) depicts an interesting scene of a king and a boy prince seated in the precincts of a palace during a starlit night attended by male and female attendants and a noble with a raised hand informing the King of some event. The textiles that have been acquired are rich and varied. Noteworthy of mention are a white Jamdani sari of late 19th century from Lucknow, a superbly rich South Indian Temple Sari of 19th century, a Patola sari from Gujarat and a brilliant Kimkhab piece of moss green ground richly brocaded with golden thread of 19th century. The few arms that have been acquired are very interesting. A jade handled Khanjar with a curved blade, and hilt in the shape of a parrot of 18th century, a pair of clippers of 19th century, and a Hansia or straight sickle with both ends having ivory handles are worthy of mention.

The museum has been fortunate in acquiring a magnificent Jain sculpture in marble. The cream white figure of Parsvanatha (measuring 32.3 cm in height) the twenty-third Jain Tirthankara, is shown seated in meditation with a seven-headed Cobra covering his head. With a srivatsa adorning his chest, the slender waist and broad shoulders bespeaks of calmness and serenity and also depict great dignity. The pedestal has an inscription in Devanagari script in two lines, giving a date in Vikram samvat 1548 equivalent to A.D. 1490, undoubtedly of the provenance of Rajasthan (see figure). Besides this, the museum has been lucky in acquiring a fragment of a sculptured black stone slab depicting Mahishasuramardini datable to 8th century, most probably of Chalukyan period. The meager number of ivories are of Goan origin and among them the figure of a reclining Madonna is worthy of mention. Of special interest are the two polychrome wooden sculptures of early 19th century South India depicting two female musicians and a double headed winged lion of gold plated wood, depicting a singha vahana of early 19th century South India.

The Indian metalware that has enriched the museum's collection is by far most interesting. The gun-powder horns of early 19th century in very imaginative shapes like mango, fish, and bitter-gourd are rare. Two palanquin parts, specially the one in the shape of rhinoceros head is of exquisite workmanship of 19th century India. A brass tribal libation cup of Madhya Pradesh of late 19th century, two copper vessels—a degchi and a flower-pot inscribed in Persian are also worthy of mention. A Bidri fakir's bowl of early 19th century with Persian inscriptions and shikargah scenes is a peerless example of metal craft. In this collection an object that deserves special mention is a globular brass bounty box with a bud-shaped knob and superb repousse work all over representing flower plants in cartouches (see fig). This magnificent object seems to be of Western Indian workmanship of 19th century.

Recent Acquisitions of Govt. Museum, Madras

ARCHAEOLOGY SECTION

Through Treasure Trove

Eight bronze images—two images of Durga, Devi, Saint, three rattler, and a fragment of a lamp—from Sembudi, Tirumayam Taluk, Pudukkottai District; one brozne image of Kali from Gandharva, Kottai Taluk, Thanjavur; three bronze images—Kali, Ayyanar, Elephant, one conch shell and two stone objects from Peyadikottai, Avudaiyarkoil Taluk, Pudukkottai District; one brass vessel from Ulundurpet, Ulundurpet Taluk, South Arcot District; one portrait from Ayankaraisankulam, Villathikulam Taluk, Tirunelveli District; one bronze Tiruvasi from Kuthiampettai, Sirkali Taluk, Thanjavur District; eight bronze images—two images of Ayyanar on elephants, three Devi images, Ganesa, Tripurantaka, and Madurai Viran from Akkaraikottayam, Mannargudi Taluk, Thanjavur District; three bronze figures—Kali, trident and a fragment from Kanginayakanpatti, Krishnagiri Taluk, Dharmapuri District; one bronze broken bell from Melathaniyam, Tirumayam Taluk, Pudukkottai District; crawling Krishna from Karuppambulam Vedaranyam Taluk, Thanjavur District; one crawling Krishna and four fragments of a bangle from Vadamazhai, Vedaranyam Taluk, Thanjavur District; Nataraja image from Kangayampalayam, Erode Taluk, Periyar District; five images—Rama, Sridevi, Bhudevi (2 images) and one pedestal from Kumulur, Avudaiyar images—Venugopala, Rukmini, Satyabhama Devi, dancing Krishna, Tripod, Conch shell and two cups—from Enadhimangalam, Tirukkoilur Taluk, South Arcot District; three crawling Krishna images and three metals from Karunguli and Ammakalathur, Kallakurichi Taluk, South Arcot District; and an embossed copper figure of Venugopala from Pudukkottai District.

Through Confiscation

Two bronze images—Krishna and Rukmini from the Additional Chief Metropolitan Magistrate, Egmore and one image of Devi from the Tehsildar, Mannargudi Taluk, Thanjavur District.

ANTHROPOLOGY SECTION

Through Treasure Trove:

A gold neckband and three melted pieces of gold from Belamaranahalli village, Palacode Taluk, Dharmapuri District; one *kasumalai* containing 123 metal coins from Kuppanpalayam H/o. Pappampatti village, Palani Taluk, Madurai District; and four items of gold coils, a bar and a mud container from Thalakkarai village, Palladam Taluk, Coimbatore District; eighteen burial potteries from Maduramangalam village, Sriperumbudur Taluk, Chengalpattu District as treasure trove items.

Through gifts

One country revolver without magazine and another revolver barrel with magazine but without handle from Thiru M. Mohanasundarapandiyan, Perunadi, Ramnad District.

Through exploration, field tour

Twenty microliths, from Muttam village, Kalkulam Taluk, Kanyakumari District.

NUMISMATIC SECTION

Through treasure trove

Ten South Indian panam from Kothankondapalli village, Hosur taluk, Dharmapuri District; fourteen South Indian panam from Sevalpatti, Vilayamgudi, Ramanathapuram District and one hundred and eight silver coins of Indo-British period.

Recent Acquisitions of Sardar Patel University Museum, Gujarat

N.H. SHASTRI

Sr. No.	*Acc. No.*	*Title*	*Media*	*Size*
1.	82.1.47	Bharat-Saubhagya	water-colour painting	32 cm. x 61cm.
2.	82.1.49	A full-length portrait of a nude male statue	—do—	73.5cm. x 25cm.

Enclosure No. 1 (B)

The following objects have been recently added to the collection of the Museum:

1. 13 original paintings of Kalaguru the late Shri Ravishankar Raval and 43 antiquities and works of art collected by him were donated by his heirs to this Museum.
2. 32 Stones collected from Hathab sea shore near Bhavnagar, Gujarat, collected by Shri C.R. Patel, Dept. of Physics, Sardar Patel University and given as a gift.
3. 13 Specimens of minerals and rocks of Gujarat given as a gift from the Directorate of Geology and Mining, Govt. of Gujarat.

A Short Note on the Recent Acquisitions of the State Museum, Lucknow

R.C. Sharma

The State Museum, Lucknow founded in 1863 is a multipurpose museum comprising sculptures, terracottas, bronzes, paintings, specimens of Natural History, Anthropology and Decorative Art. It has a rich collection of coin's ranging from 6th cent. B.C. to the modern period. The collection is being further enriched by the new additions in different sections.

Recently the museum acquired 73 objects which include coins, sculptures, terracottas, Pre & Proto Historic Objects and objects of decorative art. Among them the following are worthmentioning:-

1.	83.13.21	Chinese Jade with a human figure.
2.	83.15.3	Gold Coin of Kumargupta I.
3.	83.20.3	Gold Coin of Chandragupta II Archer Type.
4.	83.29.3	Silver *Zodiac* Coin of Jahangir, Gemini, H. Year 1027 Mint, Ahmadabad.
5.	83.32.3	Silver *Zodiac* Coin of Jahangir, Taurus Mint, Ahmadabad.

List of the Acquisitions

1.	83.6.2	Stone implement, 10 x 4.5 cms. From Goverdhan, Distt. Mathura, Stone Age.
2.	83.7.2	Stone implement, 11.5 x 6 cms. From Goverdhan, Distt. Mathura, Stone Age.
3.	83.8.2	Stone implement, 9.5 x 4.5 cms. From Goverdhan, Distt. Mathura, Stone Age.
4.	83.9.2	Stone implement, 6.5 x 4.5 cms. From Goverdhan, Distt. Mathura.
5.	83.10.2	Fossil, 30 x 27 cms.
6.	83.11.2	Fossil, 16 x 23 cms.
7.	83.12.6	Terracotta head of Siva, 16 x 12 cms. Gupta period.
8.	83.13.21	Chinese Jade with a human figure, C. 19th Cent. A.D
9.	83.14.21	Small Jade (?) Pipe, *c.* 19th cent. A.D.
10.	83.15.3	Gold Coin of Kumar Gupta I
11.	83.16.3	Gold Coin of Narsimha Gupta.
12.	83.17.3	Silver Coin of Ghazanavi.
13.	83.18.3	Silver Coin of Humayun, Delhi.
14.	83.19.12	Ram Charita Manas, Illustrated litho print. (samvat 1922).
15.	83.20.3	Gold Coin of Chandra Gupta II. Archer type.
16.	83.21.3	Gold Coin of Chandra Gupta II. Chhatra type.
17.	83.22.3	Gold Coin of Chandra Gupta II. Chhatra type.
18.	83.23.3	Gold Coin of Chandra Gupta II. Archer Type.
19.	83.24.3	Gold Coin of Chandra Gupta II. Lionslayer type.
20.	83.25.3	—do—
21.	83.26.3	--do—
22.	83.27.3	Gold Coin of Samudragupta.
23.	83.28.3	Gold Coin of Samudragupta, Standard type.
24.	83.29.3	Jahangir's Zodiac Silver coin, Gemini. Mint. Ahmadabad. H. Year 1027.
25.	83.30.3	Jahangir's Zodiac Silver Coin, Aries. Mint. Ahmadabad, H. Year 1027.
26.	83.31.3	Jahangir's Zodiac Silver Coin, Cancer surmounted by solar rays. Mint. Ahmadabad. H. Year 1027.
27.	83.32.3	Jahangir's Silver Zodiac Coin, Taurus, Mint. Ahmadabad. H. year 1027

28.	83.34.3	Jahangir's Silver Zodiac Coin, Leo surmounted by Sun rays. Mint. Ahmadabad. H. year 1027.
29.	83.34.3	A rare Silver coin of Babar. H. year 936.
30.	83.35.19	Silver ring with container, *c.* 19th cent. A.D.
31.	84.1.2	Hand axe on quartzite with a leaf fossil of flowering plant. 26x 17 cms. Early Stone Age. From Aurawana Distt. Lucknow.
32.	84.2.2	Hand axe. 16x 12 cms. Early Stone Age. From Aurawana, Distt. Lucknow.
33.	84.3.2	Hand axe, 17.5x 24 cms. Early Stone Age. From Aurawana, Distt. Lucknow.
34.	84.4.2	Hand Axe, 13x10 cms. Early stone Age, From Aurawana Distt. Lucknow.
35.	84.5.2	Hand Axe, 16.5x 9.5 cms. Early Stone Age. From Aurawana, Distt. Lucknow.
36.	84.6.2	Hand Axe, 10x 7.5 cms. Early Stone Age. From Aurawana Distt. Lucknow.
37.	84.7.2	Hand Axe, 15.5x 13 cms. Early Stone Age. From Aurawana, Distt. Lucknow.
38.	84.8.2	Hand Axe, 10 x 8.5 cms. Early Stone Age. From Aurawana, Distt. Lucknow.
39.	84.9.2	Pebble Axe, 11.5 x 8.5 cms. Early Stone Age. From Aurawana, Distt. Lucknow.
40.	84.10	Hand Axe, 15x13 cms. Early Stone Age. From Aurawana, Distt. Lucknow.
41.	84.11	Hand Axe, 12x8 cms. Early Stone Age. From Aurawana, Distt. Lucknow.
42.	84.12	Hand Axe, 11x9 cms. Early Stone Age. From Aurawana, Distt. Lucknow.
43.	84.13	Hand Axe, 14x 6 cms. Early Stone Age. From Aurawana, Distt. Lucknow.
44.	84.14	Hand Axe, 8x 7.5 cms. Early Stone Age. From Aurawana, Distt. Lucknow.
45.	84.15	Hand Axe, 12x 7 cms. Early Stone Age, From Aurawana, Distt. Lucknow.
46.	84.16 A,B,	Painted Red ware with engraved designs. *c.* 800-500 B.C. From Aurawana, Distt. Lncknow.
47.	84.17	Four Bone points. Late Stone Age. From Dadupur, Lucknow.
48.	84.18	Four Microliths, Late Stone Age. From Dadupur, Lucknow.
49.	84.19	Vertically Fossilized. Bone, 6 cms. Late Stone Age, From Dadupur, Lucknow.
50.	84.20	D. Shaped Scraper, two pieces, 3.5 cms., 2.5 cms. Late Stone Age. From Dadupur, Lucknow.

51.	84.21	Bone Scraper-4 cms. Late Stone Age. From Dadupur, Lucknow.
52.	84.22	A piece of Antelope Sub-fossilized-8 cms. Late Stone Age. From Dadupur, Lucknow.
53.	84.23	Flakes of Chalcedony of Different Sizes-Late Stone Age.From Dadupur, Lucknow.
54.	84.24	Piece of agate with few fractures-5 cms. Late Stone Age. From Dadupur, Lucknow.
55.	84.25	A sub-fossilized left upper second premolar of pony type horse. 6.5 cms. Late Stone Age, From Dadupur, Lucknow.
56.	84.26	Right tobia proxemal end broken. 22 cms. Late Stone Age. From Dadupur. Lucknow.
57.	84.27	*Bos endicus* Linn. broken pistol end of left humerus 16.5 cms. Late Stone Age, From Dadupur, Lucknow.
58.	84.28	*Bos endicus* Linn. 16.5 cms. Late Stone Age. From Dadupur, Lucknow.
59.	84.29	*Bos endicus* Linn. 11 cms. Early Stone Age, From Dadupur, Lucknow.
60.	84.30	*Canis Familiarin* Linn. Femur Shaft 14 cms. Late Stone Age. Dadupur, Lucknow.
61.	84.32 a,b	Two Sharpners of Late Stone Age 10.5 cms, 11.5 cms. Dadupur, Lucknow.
62.	84.32 a,b	Two pieces of quartzite with grooves on both the faces. 15x 12 cms, 10.6 cms. Late Stone Age. From Dadupur Lucknow.
63.	84.33 a,b	Two ground and polished tools with grooves. 7.4 cms, 4x3 cms. New Stone Age. Dadupur.
64.	84.34 a,b	Pieces of hand made pottery with cord design. 1000 B.C. 14x11 cms. 10x10 cms. From Dadupur.
65.	84.35. a	Four beads 1000 B.C. From Dadupur, Lucknow.
66.	84.35 (b)	A piece of quartzite with mat design on Rev. 3.5x 3 cms. New Stone Age, From Dadupur.
67.	84.36	Copper axe with broken end. 5x4cms. Copper Age. Dadupur, Lucknow.
68.	84.37 a,b	Crucible. 7 cms. From Dadupur, Lucknow.
69.	84.37 b	Crucible. 4 cms. From Dadupur, Lucknow.
70.	84.38	Copper Coin. Kushana Period. From Dadupur.
71.	84.39 a	Ochre coloured potsherd. 7x4 cms. 600 B.C. From Dadupur.
72.	84.39 b	Rim portion of storage Jar. 2 cms. 600 B.C. From Dadupur, Lucknow.
73.	84.40	Four fragments of stone Age. Aurawana, Lucknow.

Govt. Museum & Art Gallery, Chandigarh

V.N. SINGH

(*Recent Acquisitions* 1983-84)

One image of Uma-Maheshvara was recently acquired by the Govt. Museum and Art Gallery, Chandigarh, which is described below:

Uma-Maheshvara
Cream Sandstone
53 x 40 cms.
Gujjar Kheri, Distt. Sonepat (Haryana)
C. 11th Cent. A.D.
Acc. No. 4289.

On a raised *triratha* pedestal, both Shiva and Uma are shown seated on Nandi, the divine-bull. Shiva sits in the *lalitasana* on a carpet placed on the back of the bull. Uma sits on the left thigh of Shiva. Shiva has four-hands, while Uma has only two. With his principal left hand Shiva holds Uma in embrace, his hand resting on the left breast of the goddess. Uma's hand is gently resting on his right shoulder. The principal right hand of Shiva holds a blue lotus (*nilakamala*). Shiva' additional right hand is broken which presumably held the trident (*trisula*). The upper part of the trident is also broken. The additional left hand of Shiva holds a snake. The head of Shiva is set against an aureole with an elaborate lotus boss. Shiva has on his head the elaborate *jatamukuta* and wearing a long garland like the *vanamala* of Vishnu. He also wears ear ornamants, necklace, armlets and anklets. Uma sports the *dhammila* coiffure. The fore part of the left arm of Uma is broken, but presumably it holds either a lotus or a mirror (*darpan*). Uma also wears circular beaded ornaments, pendant string falling between breasts, double stringed pearl necklace, wristlet and an elaborate girdle with which is secured the lower garment. On the left there is the representation of lord Vishnu seated in *lalitasana*. The principal right hand of Vishnu is in *adhaya-mudra* and the principal left hand is holding a conch (*shankh*). The additional right and left hand hold mace (*gada*) and discus (*chakra*) respectively. Left part of the stele is broken. There are the representation of Ganesh and Kartikeya on right and left side respectively on the pedestal. Ganesh is holding probably a hatchet, a goad and a vessel of a sweet balls and is seated in *lalitasana*. Kartikeya is also seated in *lalitasana* and holds spear (*shakti*) in his left hand, the other one being indistinct. Near the right foot of Shiva is a damaged male figure which may be identified as that of Bhringi. Just behind Ganesh and Kartikeya are shown standing female figures holding wreaths in their hands. They wear beautiful dress and jewellery and stand very gracefully. On the two receding projections or the pedestal stand a male figure on either side. One of the proper left is mutilated but a long staff can be seen in his left hand. On the other side, however, the attendant figure is complete. He is shown as holding a bowl in the right hand and a club in the left. These attendant figures may be identified as Kaal and Mahakaal.

Iconographically the image represents the basic characteristic of medieval period rendering the Uma-Maheshvara theme. The stylistic characteristics of the sculpture are quite interesting. The third eye on the forehead of Shiva, however, is absent. The body limbs of both the figures are elongated. This feature gets a visual balance in the slightly void shape of the faces. The unusual sitting posture of the figure Uma and the twist of her body represent the sculptor's inept innovation. But the highlight of the sculpture is the naturalistic treatment in depicting the upward turned face of the divine bull, Nandi, who is having the view of the divine couple. The graceful and gliding nature of the long garland of Shiva also adds considerably to the compositional cohesion. The plastic treatment of the body of Shiva is quite sensitive. The facial features of Shiva and Uma also deserve special reference. Almost round and full the faces have an abstract character which is enhanced by the cursory carving of the eyes and hairlines. The full rounded breasts of Uma and her deep naval perpetuate some of the classical notions of female beauty. In overall stylistic treatment, the present image breaths the air of medieval period and is a fine example of Gurjara-Pratihara art tradition.

New Acquisitions Bharat Kala Bhavan Banaras Hindu University

B.N. JHA

Following objects were collected in Bharat Kala Bhavan, Banaras Hindu University during the years 1980-1983.

1980

In the year 1980 the museum collected 189 objects through purchase and donation. This includes 21 textiles, 3 paintings, 117 objects of decorative arts, 28 wooden sculptures and 5 objects for the manuscript section. Of these 155 objects were received as donation from Dr. Lakshmi Bai Rajwade of Gwalior.

Among these, mention may be made of a beautiful painting of Vedavyas as dictating Mahabharat to Ganesh, painted by Khitindranath Majumdar (Acc. No. 1.80). An illustrated manuscript on palm leaf (Acc. No. 33.80), Usha Vilasa in Oria script written by Gopinath Das at the time of Ramchandra Gunpatideva of 18th cent. has also been collected. In the textile section a Patka of Tasi fabric with a work of enamel and Karchobi work has enriched the collection (Acc. No. 2.80)

1981

In this year the museum added in its collection 369 objects; of these 209 objects are litarary materialas, 16 stone sculptures, 35 copper coins, 26 silver coins and 2 proof coin sets belonging to the Government of India mint. Besides, we got 1 painting, 25 decorative art objects and 14 objects related to the gallery of Banaras through the ages.

One handwritten copy of dispersed pages of a manuscripts of Kalidas, letters of distinguished persons, old documents and rare books were acquired. 61 coins came as a donation from State Museum, Lucknow, out of which 15 copper coins belong to Trisuli's one Pai sikka, 7 silver coins of Muhammad Shah were collected in fresh mint condition from Fatehpur mint. One Victoria Silver coin and 7 Edward Silver coins from Bijnor, 11

George Fifth's coins from Kheri (Bijnor), 7 coins of Sher Shah Suri and 13 copper coins of Islam Shah from Hamirpur have also been added.

1982

This year 242 objects were acquired. 12 stone sculptures, 6 ivories, 1 terracotta, 1 wooden sculpture, 30 coins, 55 Literary materials and 112 Postage stamps were added to Bharat Kala Bhavan collection. Of the collections made during this year special reference may be made of a manuscript of 1821 Vikram Samvat on Rajasvala Stotra (Acc. No. 238.82) and Yakshini Kalpa Manuscript of v.s. 1873. One gold coin of Wajid Ali Shah (Acc. No. 164.82) has also been purchased. One rare gold coin of Huviska (Acc. No. 202.82) has also been collected.

1983

In this year 330 objects have been added in the collection of Bharat Kala Bhavan. Out of these, there are 5 gold coins, 78 silver coins and 5 copper coins, 7 textiles, 92 literary materials, 16 paintings, 81 decorative art objects and 46 Photographs for Banaras section have been acquired.

Special reference should be made of a Archer type gold coin of Chandragupta II (Acc. No, 1.83)2 gold coins of Narasimhagupta (Acc. No. 5. 83 & 273.83). One Asvamedha type of Samudragupt's (Acc. No. 97.83) and one gold coin of skandgupta (Acc. No. 274.83) were also added in the collection. Of the Silver coins 10 coins of Assam, 2 of Akabar, 1 half rupee coin of Jahangir are worthy of note. The collection also includes one Bengal Sultan coin, one set of 3 coins of Bundi state, 4 coins of Kuninda and one complete set of 32 silver coins of East India Company, have been added in this collection.

Bharat Kala Bhavan collected during the period of our issue certain textiles Jamdani, Jardoji, Maslin and Brocades of late 19th cent. A.D. One manuscript of Gita with Sridharitika of Vikram Samvat 1676 has also been added in the literary section and a letter of martyr Shri Rajendra Nath Lahiri have also been added to the literary section. Besides 46 old and rare Photographs of the Ghats of Banaras were acquired for Banaras Gallery. A donation of 15 paintings by Late Shri Dinesh Bakshi, a renowned painter of Bombay School was sent to this museum by his wife Smt. Uma Bakshi as donation.

Publications of Different Museums

LIST OF PUBLICATIONS

S.No.	Name of Museum	Address	Title of Publisher	Name of the Author	Price
1	2	3	4	5	6
					Rs. Ps.
1.	National Museum	Japnath, New Delhi.	(a) *Masterpieces of Early South* Indian Bronzes.	Dr. R. Nagaswamy	240-00
			(b) *Krishna, the Bhagavata Purana, the Gita Govinda and other texts.*		36-00
			(c) *Indian Coinage*	Miss R. Vanaja	120-00
			(d) *Russian Decorative Arts and Jewellery.*		105-00
2.	Salar Jung Museum	Baradari, Hyderabad-500020.	(a) *Salar Jung Museum Biannual Research Journal*, Vol: XV-XVI		Not fixed
			(b) *Colour Transparencies*		35-00
			(c) *Catalogue of Persian Manuscripts*, Vol: VIII		Not fixed
3.	Bharat Kala Bhavan, Banaras.	Banaras Hindu University, Varanasi.	(a) *Chhavi.* (Golden Jubilee Volume)	Edited by: Prof. Anand Krishna	500-00
			(b) *Chhavi-2* (Raj Krishnadasa Felicitation Volume)	” ”	700-00

1	2	3	4	5	6
			(c) *Woollen Textiles and Costumes from Bharat Kala Bhavan*, 1981. 70 pp. and 60 plates.	Chandramani Singh and Devaki Adivasi.	165-00
			(d) *Gupta Gold Coins in Bharat Kala Bhavan*, 1981. 87 p.p. and 14 plates.	P.L. Gupta and S. Srivastava	100-00
			(e) *The Bundi Gita-Govinda*, 1981. 172 p.p.	Dr. (Smt) Kapila Vatsyayan	175-00
			(f) *Ramayana*. 6 plates.	O.P. Tandon and Kamal Giri	40-00
			(g) *Radha Krishna* 6 Plates.	T.K. Biswas	
			(h) *Games in Indian Miniatures*. 10 Plates including 2 on cover	T.K. Biswas and Km. Sarala Chopra	125-00
			(i) *Bhagvata Purana (Krishna-Lila)* 6 plates.	Km. Yashodhara Agrawal	50-00
			(j) *Index to Marg*	K.B. Singh	15-00
			(k) *Index to Lalit Kala*	I.B. Singh	15-00
			(l) *Index to Rupam*	I.B. Singh	15-00
4.	State Museum	Lucknow	(a) *Bulletin of Museums and Archaeoloogy*. No. 29-30 (Joint Issue) June-Dec. 1982.		10-00
			(b) *Bulletin of Museums and Archaeology*, No. 31. June 1983.		6-00

LIST OF PUBLICATIONS OF SARDAR PATEL UNIVERSITY MUSEUM GUJARAT

1. *Name of the Publication*	*Editor/Author's name*	*Year of Publication*	*Price*	*Pages*
1. *Vallabh Vidyanagar Research Bulletin*, vol. 1 issue no. 1	Shri A.V. Pandya (Editor)	1957-58	5—00	152
2. " Vol. 1 issue no. 2	—do—	—do—	10—00	251
3. *Lost Sarswati*	Shri A.V. Pandya	1967	30—00	265
4. *University Museum of Sardar Patel University*, Vallabh Vidyanagar—Its Past, Present and Future (a brochure)	Prepared by Shri N.H. Shastri	1977	Nil	4
5. *Sardar Patel University nu Museum —EK Parichaya*	—do—	1979	Nil	4

PUBLICATIONS OF GOVT. MUSEUM, MADRAS

Anthropology Section:

1. *The Tali Rite in relation to South Indian Initiation Rites* by C.J. Jayadev	1984	Available with the Director of Museums, Govt. Museum, Madras-8.	Rs. 7.55
2. *Guide to Bronze Gallery by* Thiru V.N. Srinivasa Desikan	Nov. 1983	—do—	Rs. 4.00
3. *Museum Brochure*	1982	—do—	0.75

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PUBLICATIONS
OF THE
MUSEUMS ASSOCIATION OF INDIA

Journal of Indian Museums
Vol. 1 to XXXIV in 22 issues : each at Rs. 15.00; abroad $3.00
Vol. XXXV 1979 : Rs. 25.00; abroad $ 5.00
Vol. XXXVI 1980: Rs. 30.00
Vol. XXXVII 1981: Rs. 30.00
Vol. XXXVIII 1982: Rs. 50.00.
Vol. XXXIX 1983: Rs. 50.00

Brief Directory of Museums
The Brief Directory of Museums in India compiled by Usha Agrawal, gives the names, addresses, telephone numbers, scope, timings, etc., of almost all the museums in India. Third edition (revised and enlarged) Rs. 5.00; abroad $ 1.00.

Patolu of Gujarat
An authoritative treatise on Patolu Textile of Gujarat by A.N. Gulati. Printed on art paper, fully illustrated in colour and black & white. Price Rs. 5.00 abroad $ 1.00.

Museums Architecture
The book being the proceedings of the 1971 All India Museums Conference on Museum Architecture discusses museum building requirements. Price Rs. 5.00; abroad $ 1.50.

Index to the Journal of Indian Museums
Index to volumes 1 to XXVIII of the Journal of Indian Museums classified authorwise and subjectwise. Price Rs. 8.00.

Documentation in Museums
The book edited by O.P. Agrawal presents the proceedings of the 1973 All India Museums Conference. It discusses all aspects of documentation work in museums. Price Rs. 15.00; abroad $ 3.00; for members Rs. 7.50.

The Small Museum
Edited by O.P. Agrawal, the book discusses the various problems of small museums, including building, conservation, educational activities, community participation, etc. Price Rs. 20.00; abroad $ 3.00.

Museum Security
Edited by O.P. Agrawal, the monograph presents the problems of museums security in all its aspects. Price Rs. 25.00; abroad $ 5.00.

Packing and forwarding charges will be extra

Orders can be sent to the Secretary, Museums Association of India c/o National Museum, Janpath. New Delhi-110011 (India).

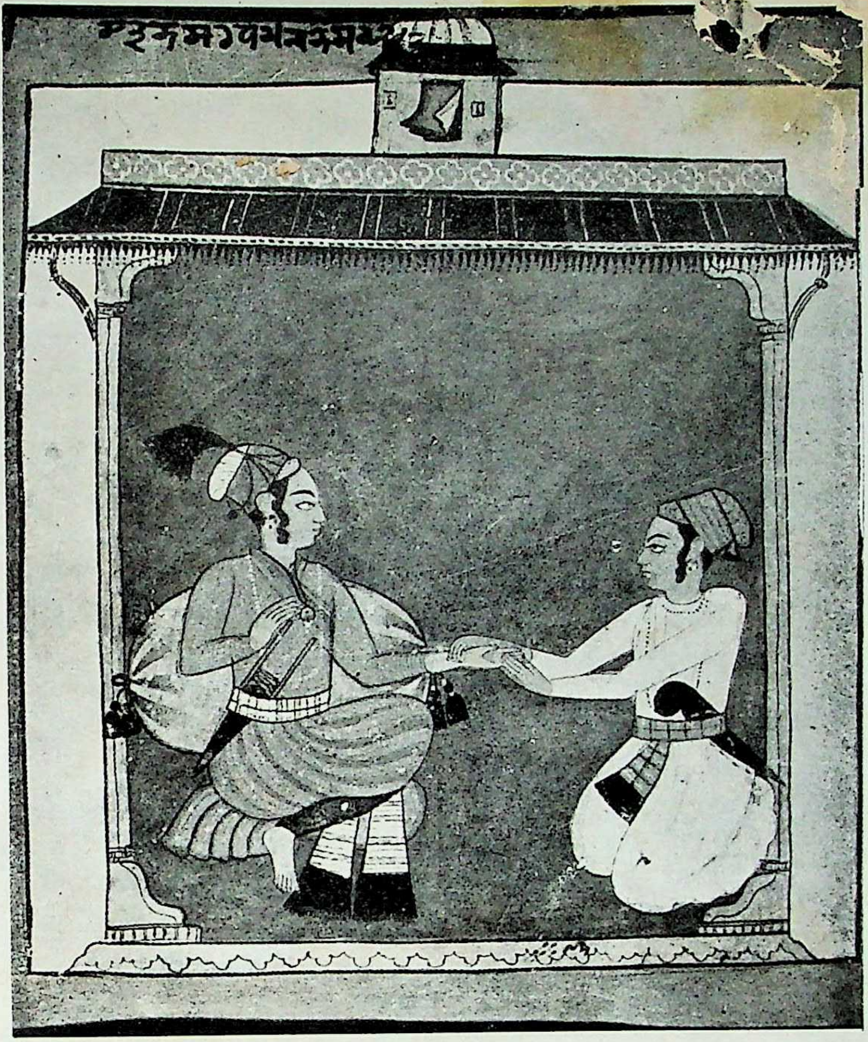

Fig. 1. Raga Putra Prabala, Basholi, A.D. 1740.

[illegible] Kandan Moosa [illegible] aftsman, who led the team which demonstrated the casting of '*Charaku*' the giant cauldron of Kerala, in New Delhi, presenting a *Nilavilakku*, the traditional brass lamp to the **Prime Minister**, Smt. Indira Gandhi at her residence on June 18, 1982.

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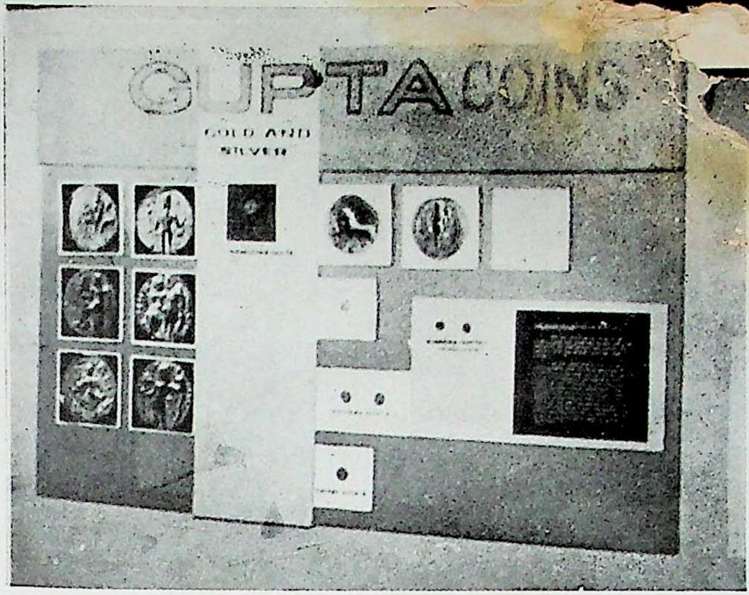


Fig. 3. Display of coins in Museum and Picture Gallery, Baroda.

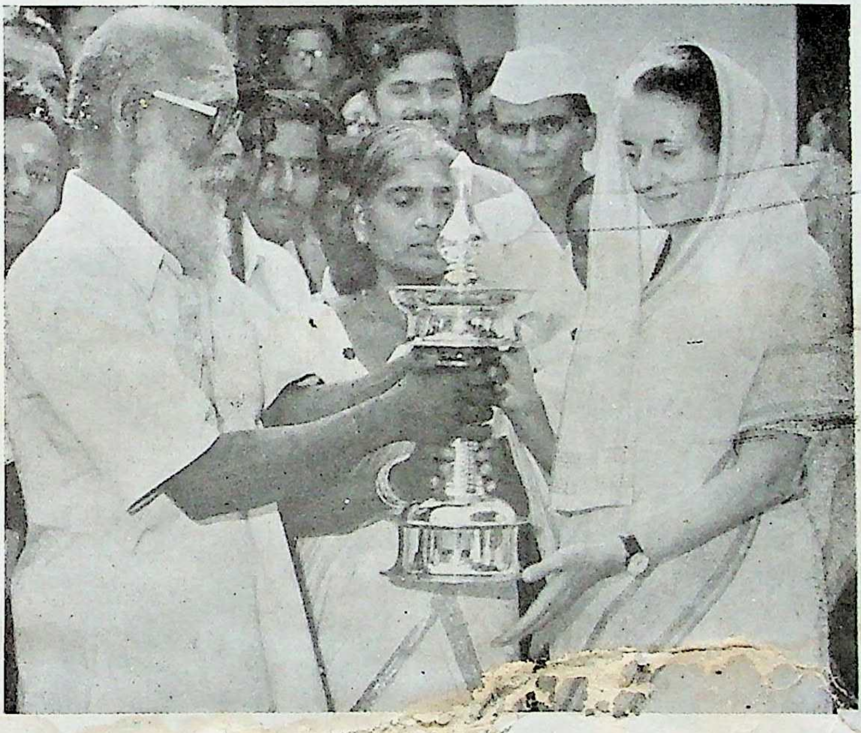


Fig. 4. Shri Kandan Moosari [illegible] craftsman, who led the team which demonstrated the casting of '*Charaku*' the giant cauldron of Kerala, in New Delhi, presenting a *Nilavilakku*, the traditional brass lamp to the **Prime Minister, Smt.** Indira Gandhi at her residence on June 18, 1982.

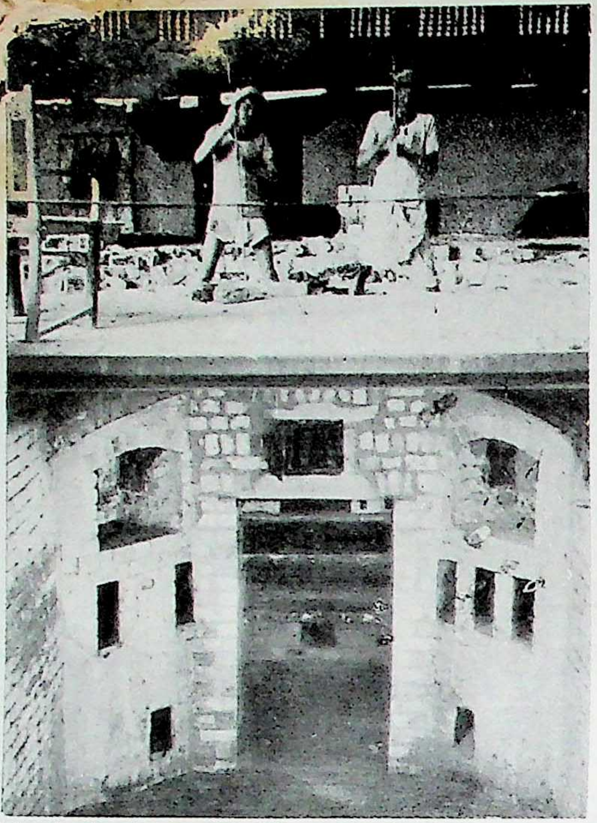
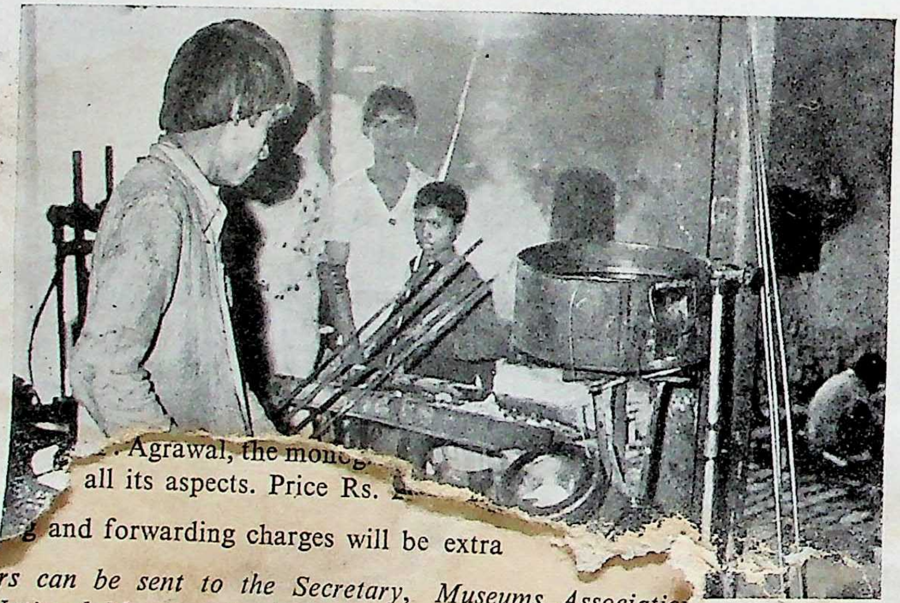


Fig. 5. The bottom of a furnace under construction.



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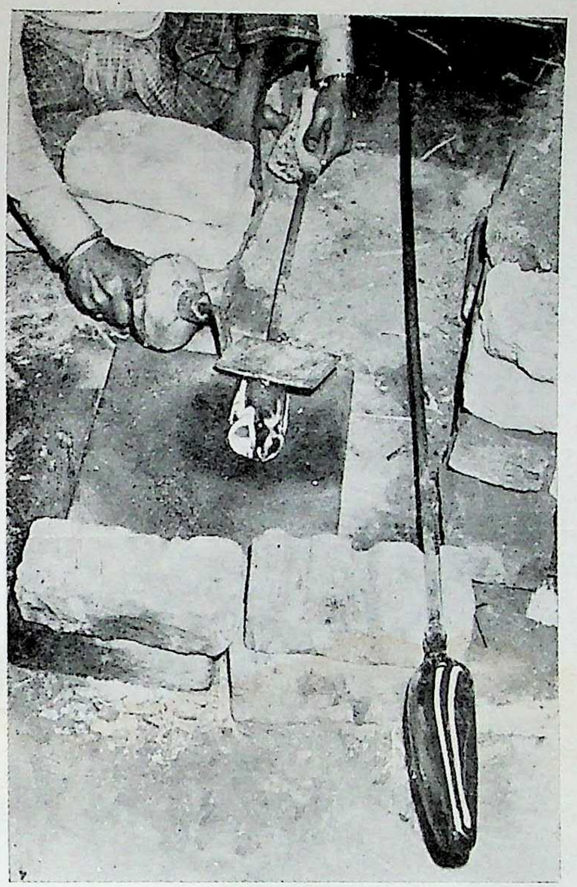


Fig. 7. The *lom* is being given a proper shape. The final shape of the *lom*, after the step in fig. 5 can be seen at the right hand bottom corner.

)osa [illegible] iftsman, who led the team which demonstrated the *aku'* the giant cauldron of Kerala, in New Delhi, presenting a e traditional brass lamp to the **Prime Minister, Smt. Indira Gandhi** ce on June 18, 1982.

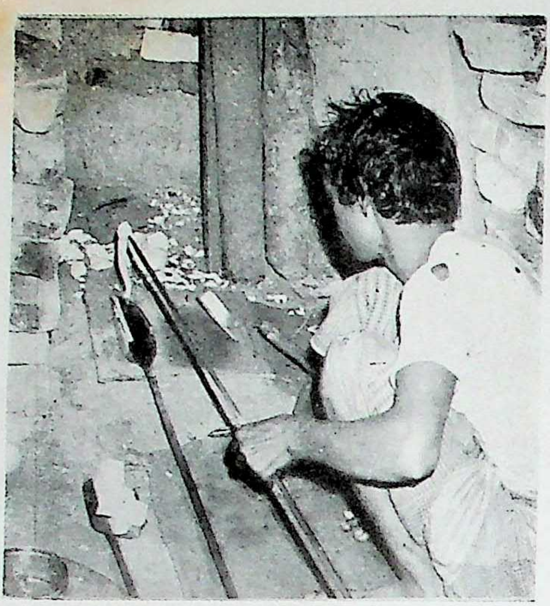
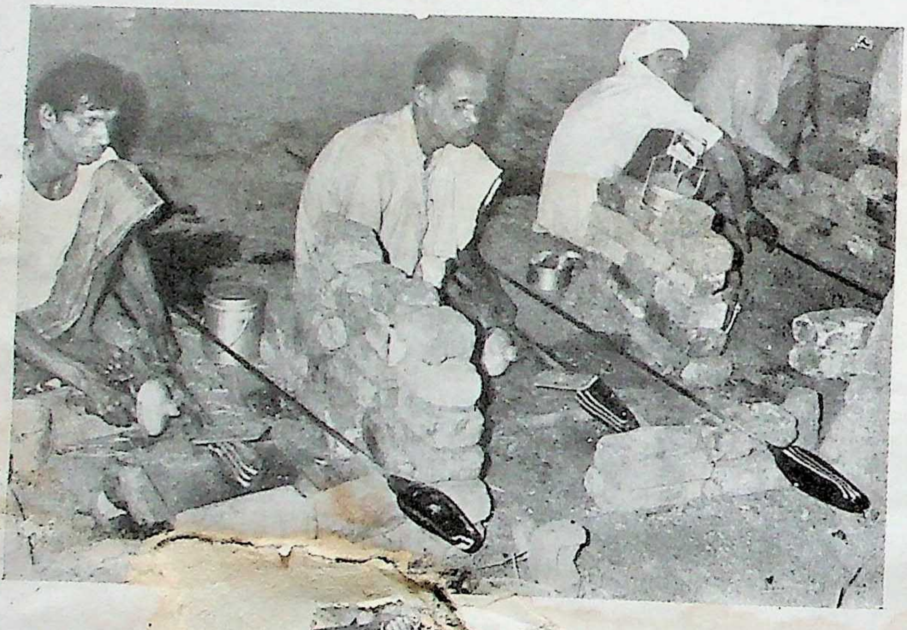


Fig. 8. Decorative coloured glass being applied over the *lom*.



[illegible] final shape by *pelwala*.

is being cooled

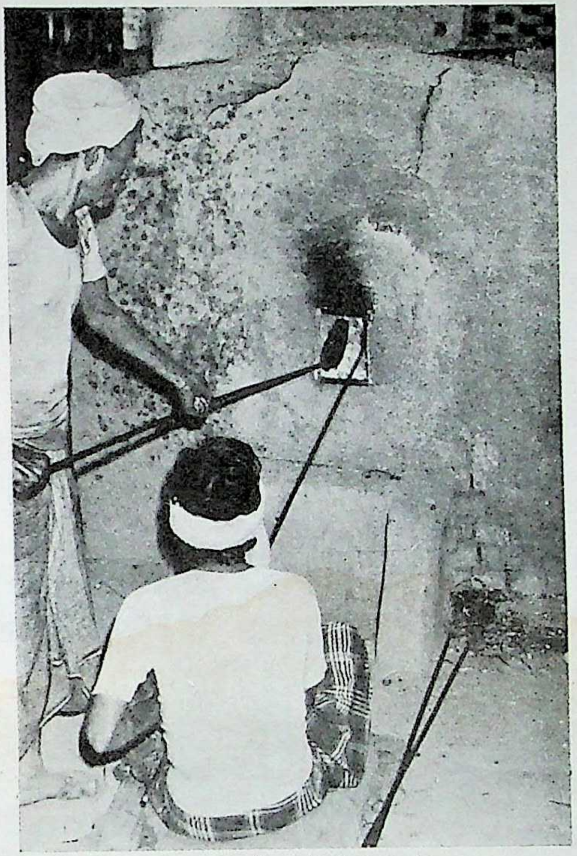


Fig. 10. A. *tarkash* at work.

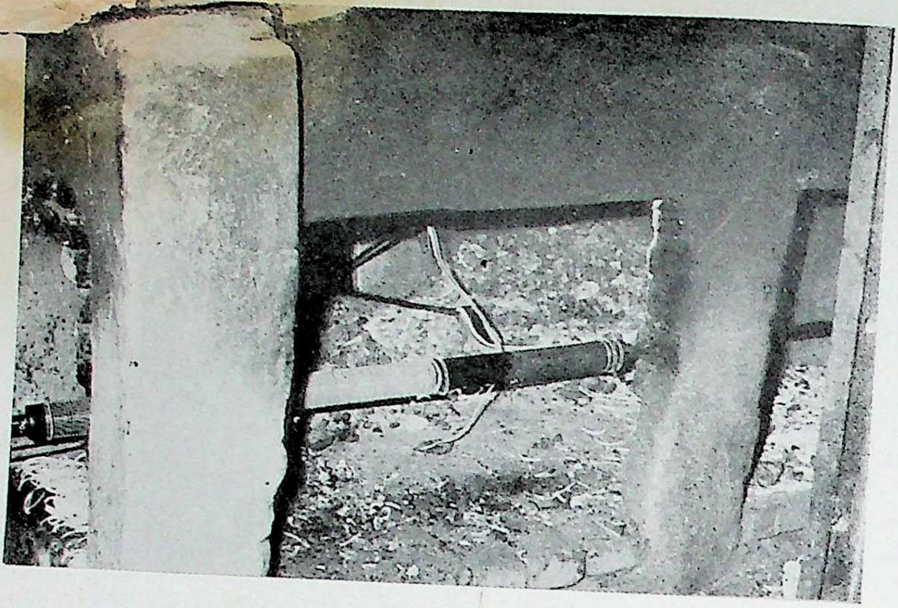
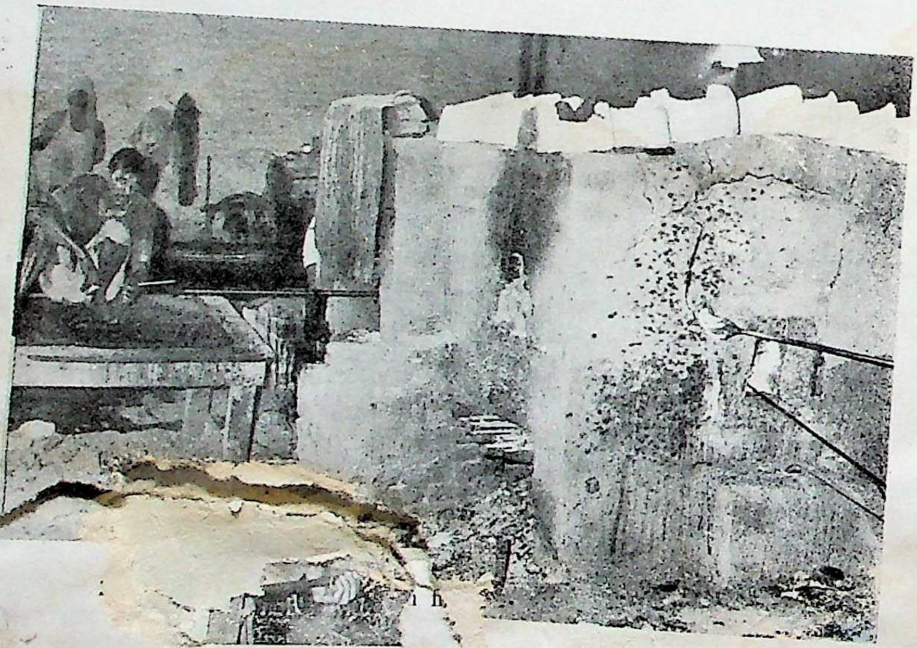


Fig. 11. The *belan* inside *bhatti* as seen from the back side.



is being cooled [illegible] tting the *lo a* ins[illegible] *bhatti* can be

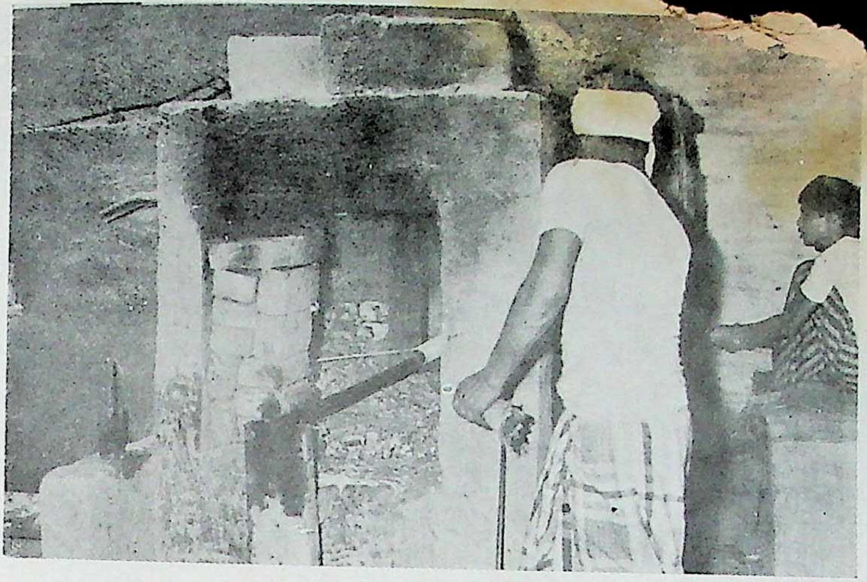


Fig. 13. The *tar* is getting wound on the *belan*. The job of the person sitting on the righ hand side is to cool the *belan* with a wet cloth.

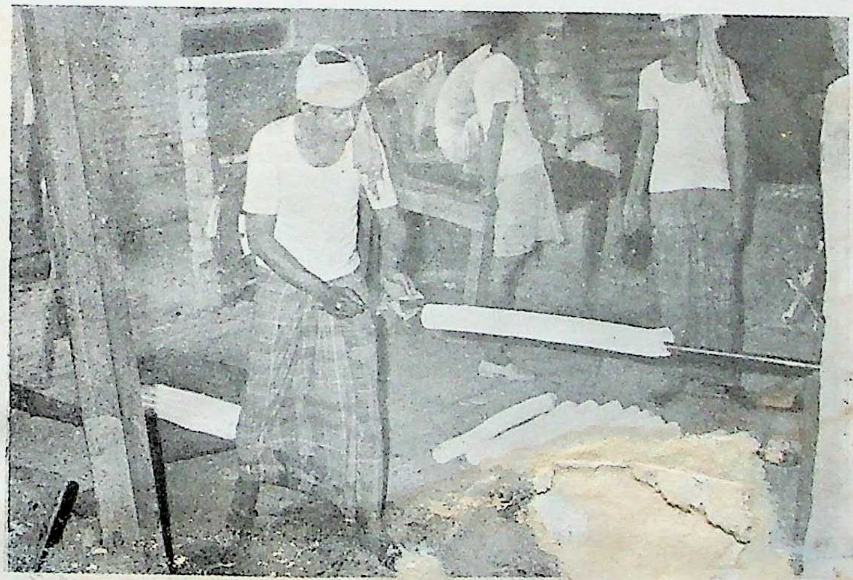


Fig. 14. The *tar* spiral [illegible]

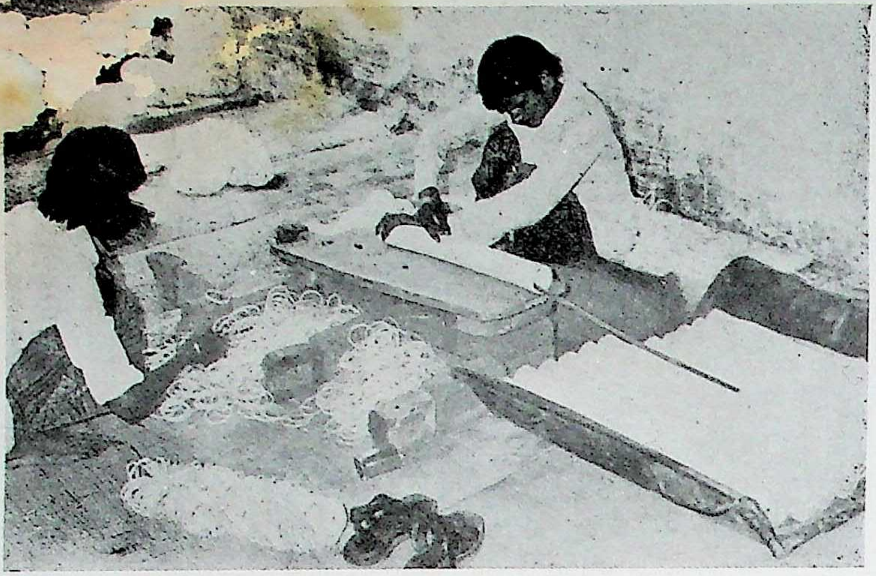
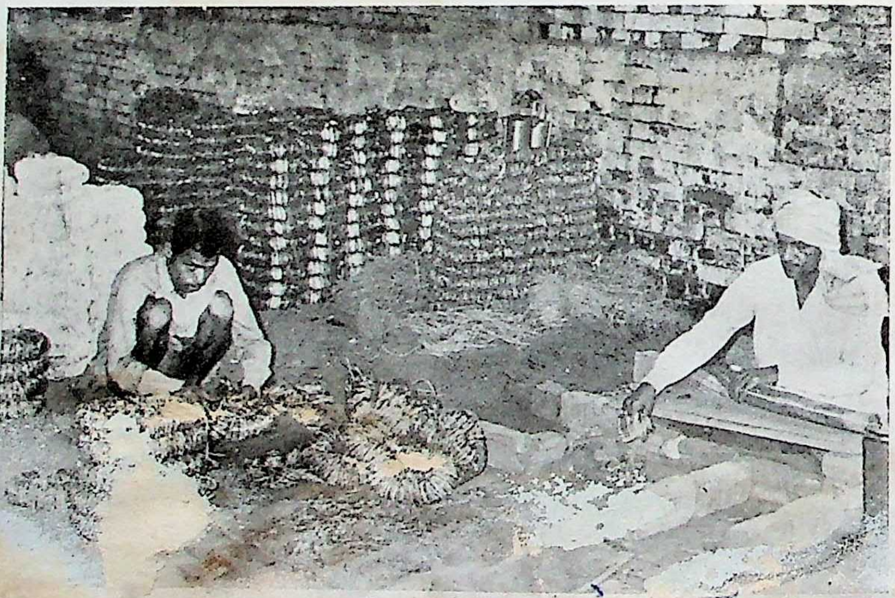


Fig. 15. *Tar* spiral being cut with a glass cutting diamond edged blade.



[illegible] re being sorted [illegible]

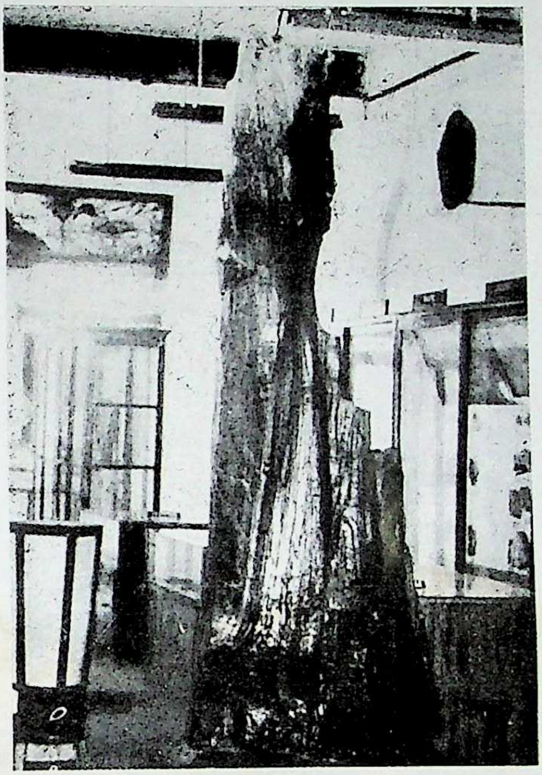


Fig. 17. *Dadoxylon* sp. A fossil tree trunk, new acquisition, Agharkar Museum, Botany Department, University of Allahabad.

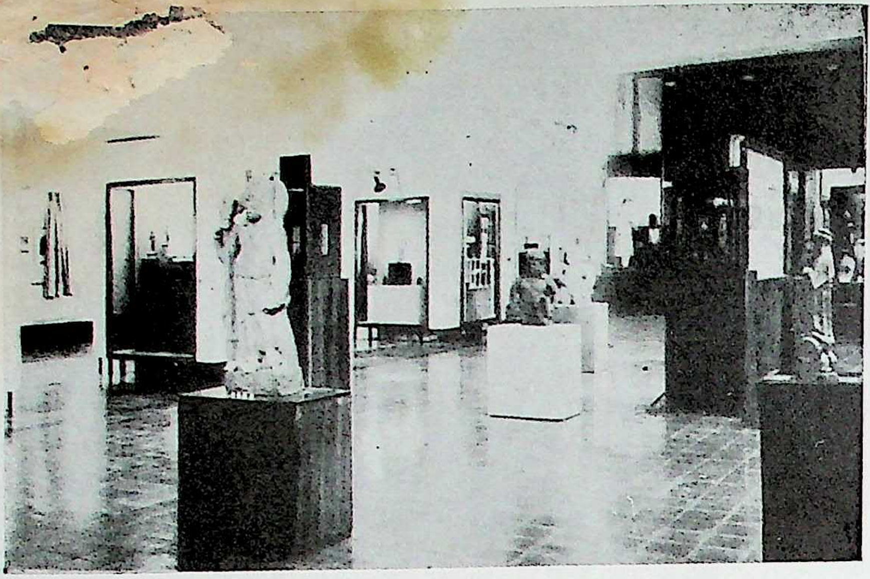


Fig. 18. General view of the exhibition 'Art Treasures from Museums in Maharashtra.'

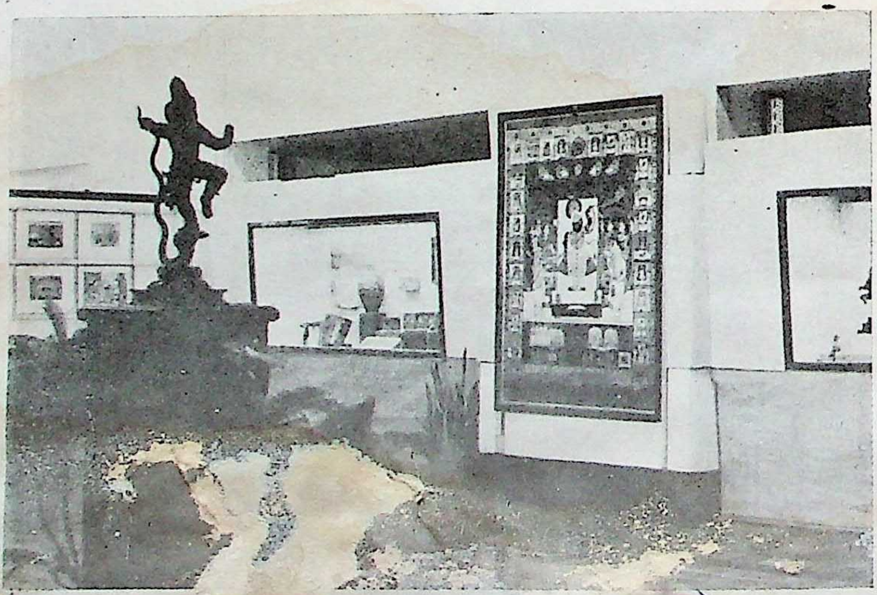


Fig. 19 General [illegible] the exhibition 'The Krishna [illegible] in Indian Art.'

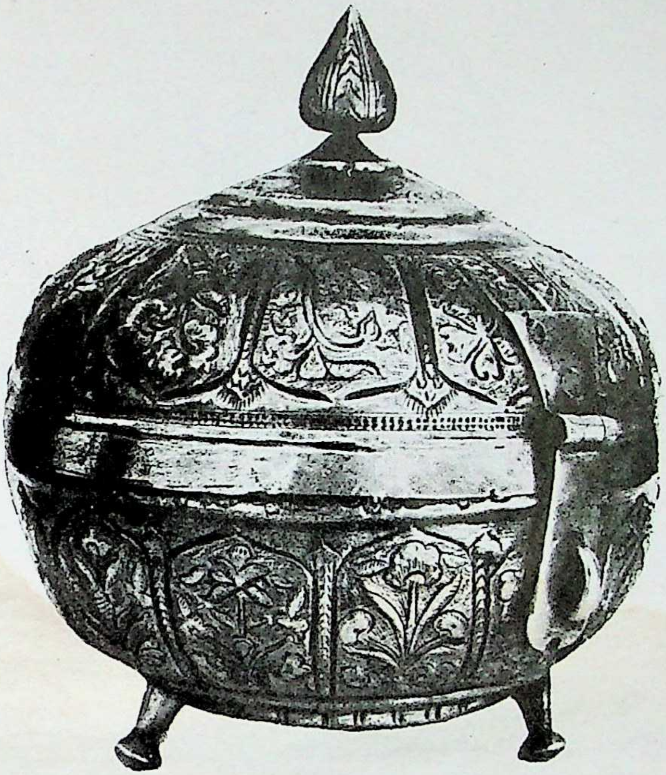


Fig. 20. Brass Bounty Box, new acquisition, Salar Jung Museum, Hyderabad.

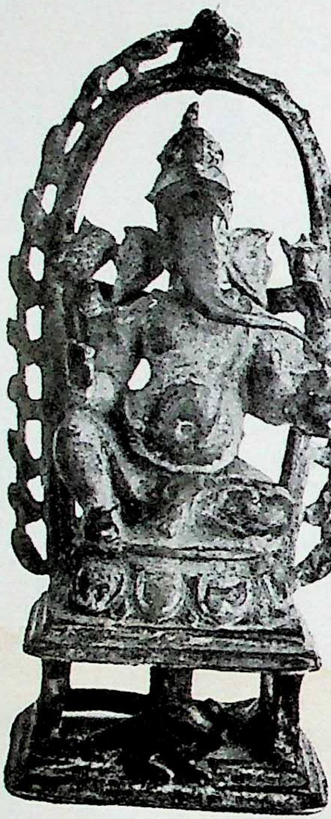


Fig. 21. Ganesh, new acquisition,
Salar Jung Museum,
Hyderabad.

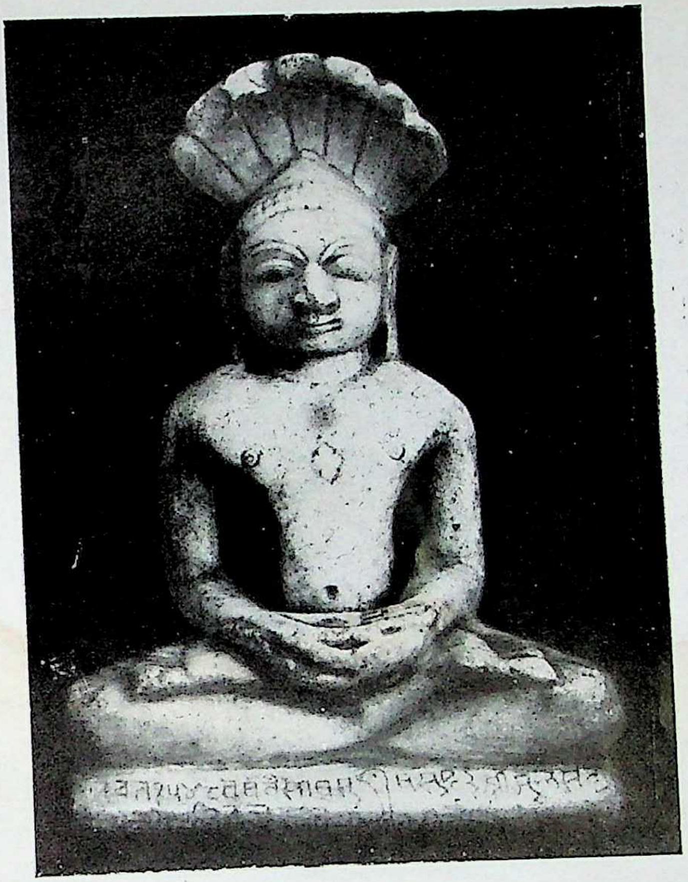


Fig. 22. Parshvanath, new acquisition, Salar Jung Museum, Hyderabad.

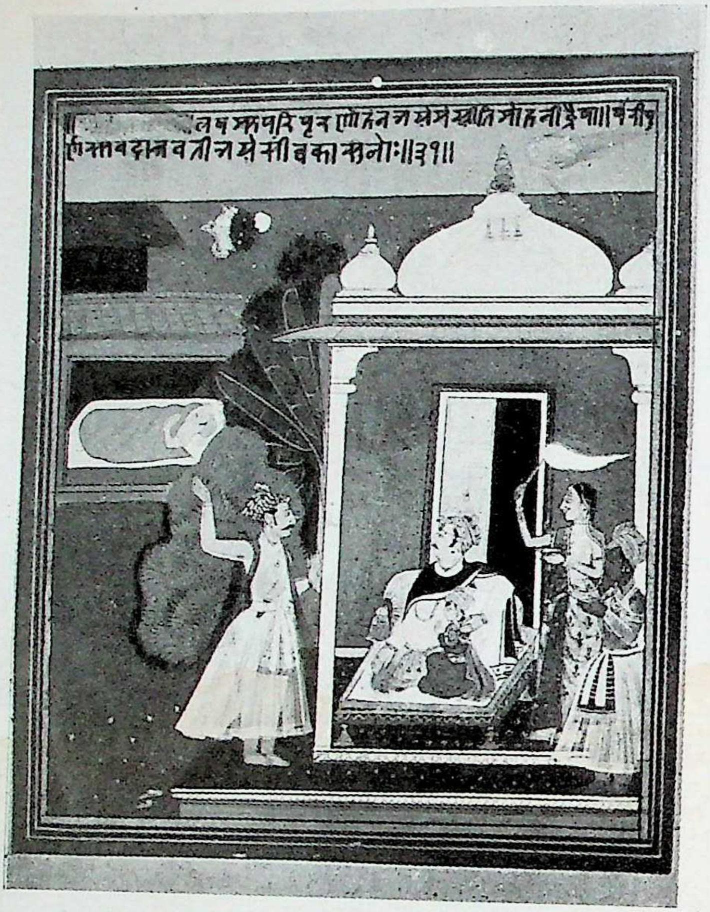


Fig. 23. An episode from *Sarangtantra* series, new acquisition, Salar Jung Museum, Hyderabad.

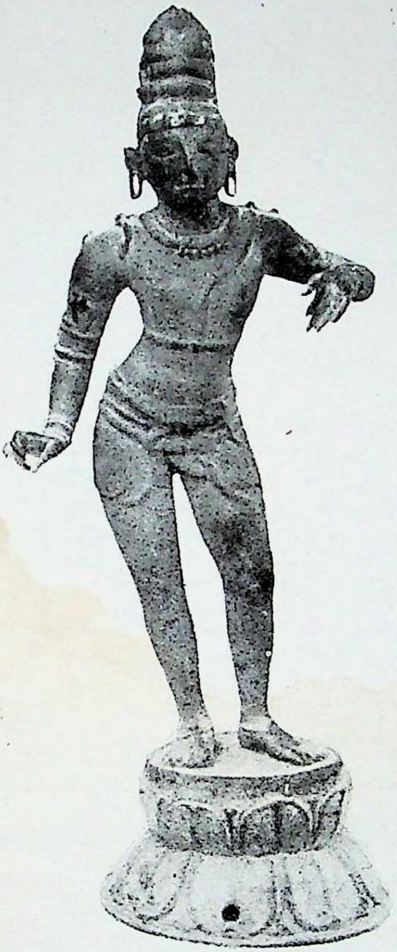


Fig. 24. Krishna, front view, new acquisition, Govt. Museum, Madras.

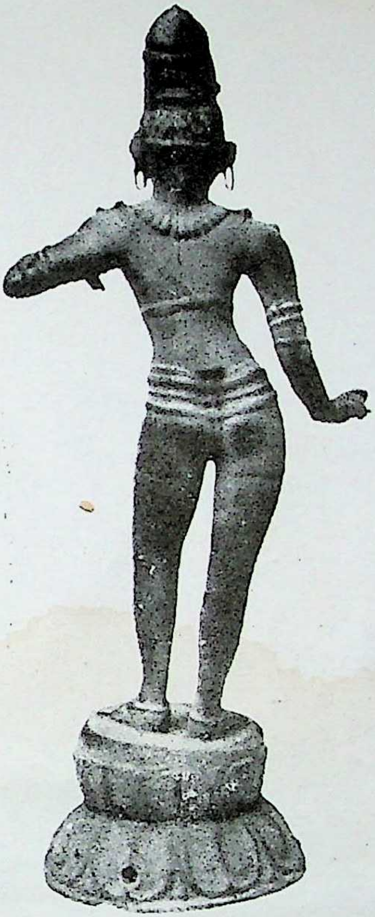


Fig. 25. Krishna, back view, new acquisition, Govt. Museum, Madras.

CC-0. In Public Do n. UP State Museum, Hazratganj. Lucknow

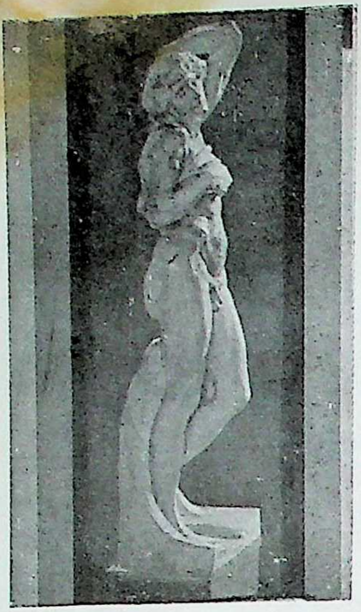


Fig. 26. Portrait of a nude male, new acquisition, Sardar Patel University Museum, Gujarat.

[illegible]

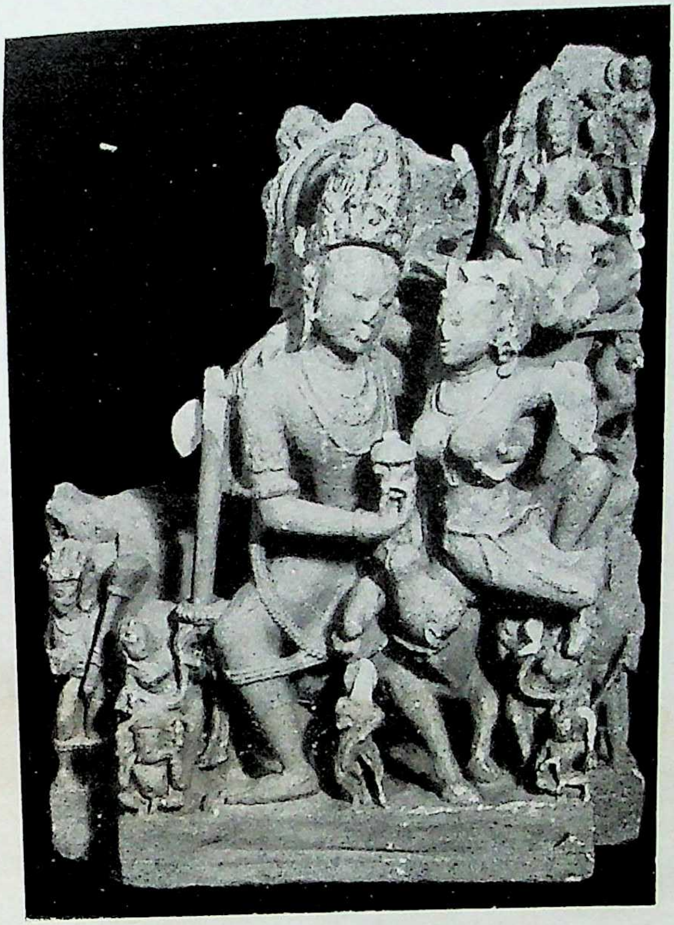


Fig. 28. Uma-Maheshvara, new acquisition, Govt. Museum and Art Gallery, Chandigarh.

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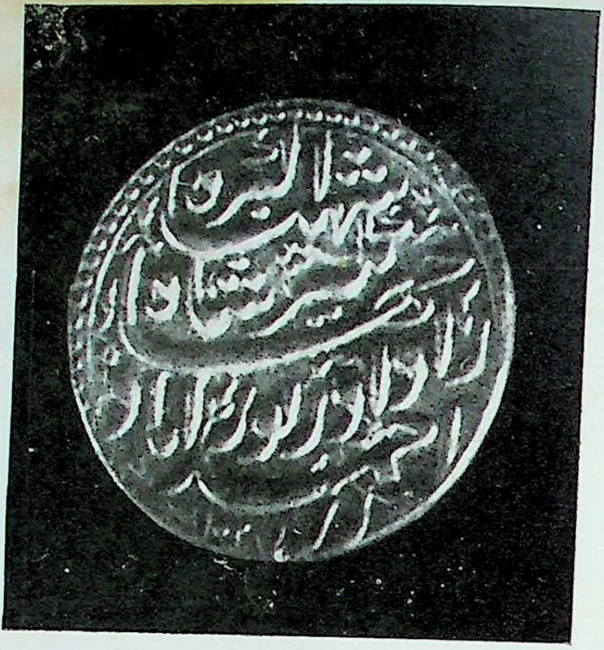

Fig. 29. Zodiacal coin of Emperor Jahangir, back view, new acquisition, State Museum, Lucknow.

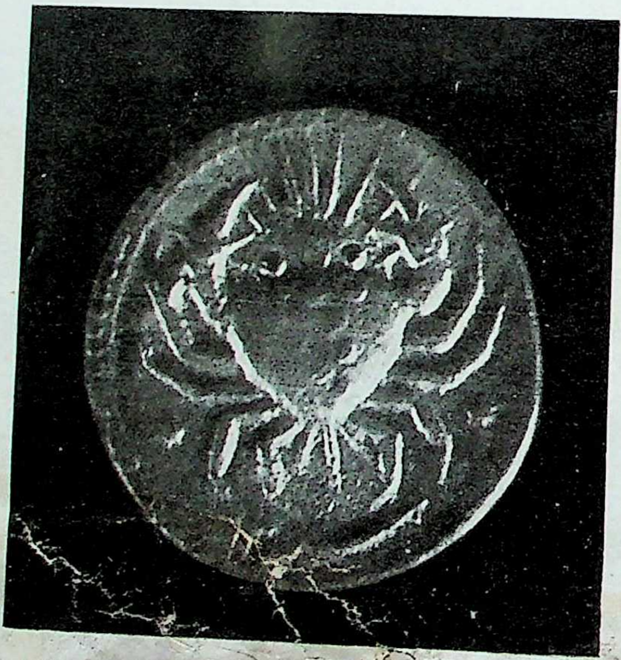

Fig. 30. Zodiacal coin of Emperor Jahangir reverse/ne acquisition, State Museum, Lucknow.

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